UNITED STATES NAVAL INSTITUTE PROCEEDINGS

Vol. 56 DECEMBER, 1930 No. 334

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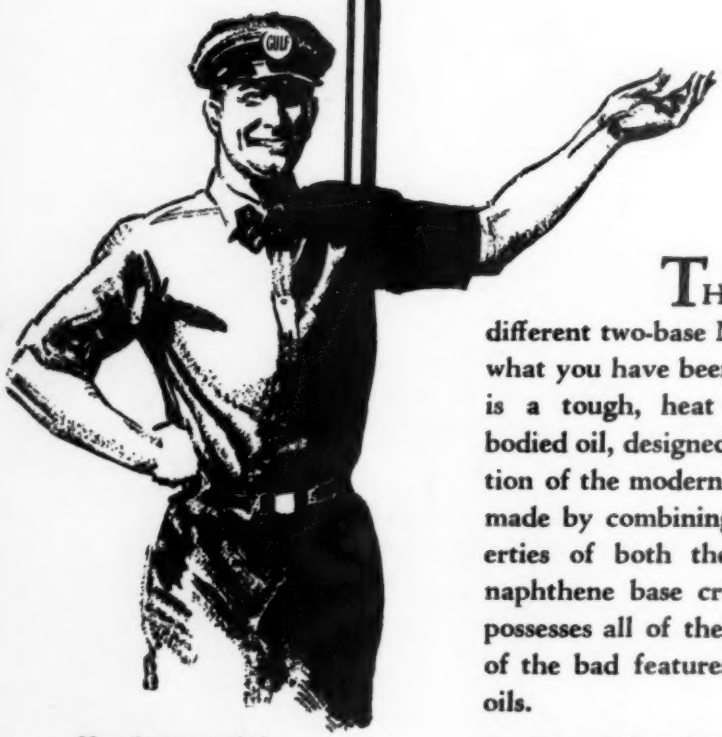

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December, 1930

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WORLD'S RECORD FOR SPEED WITH LOAD

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WORLD'S RECORD FOR ALTITUDE WITH LOAD

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By Ewing Galloway, New York

PAGET PARISH, BERMUDA

Along the North Shore Drive of Paget, skirting Hamilton Harbor, with the city of Hamilton in the distance.

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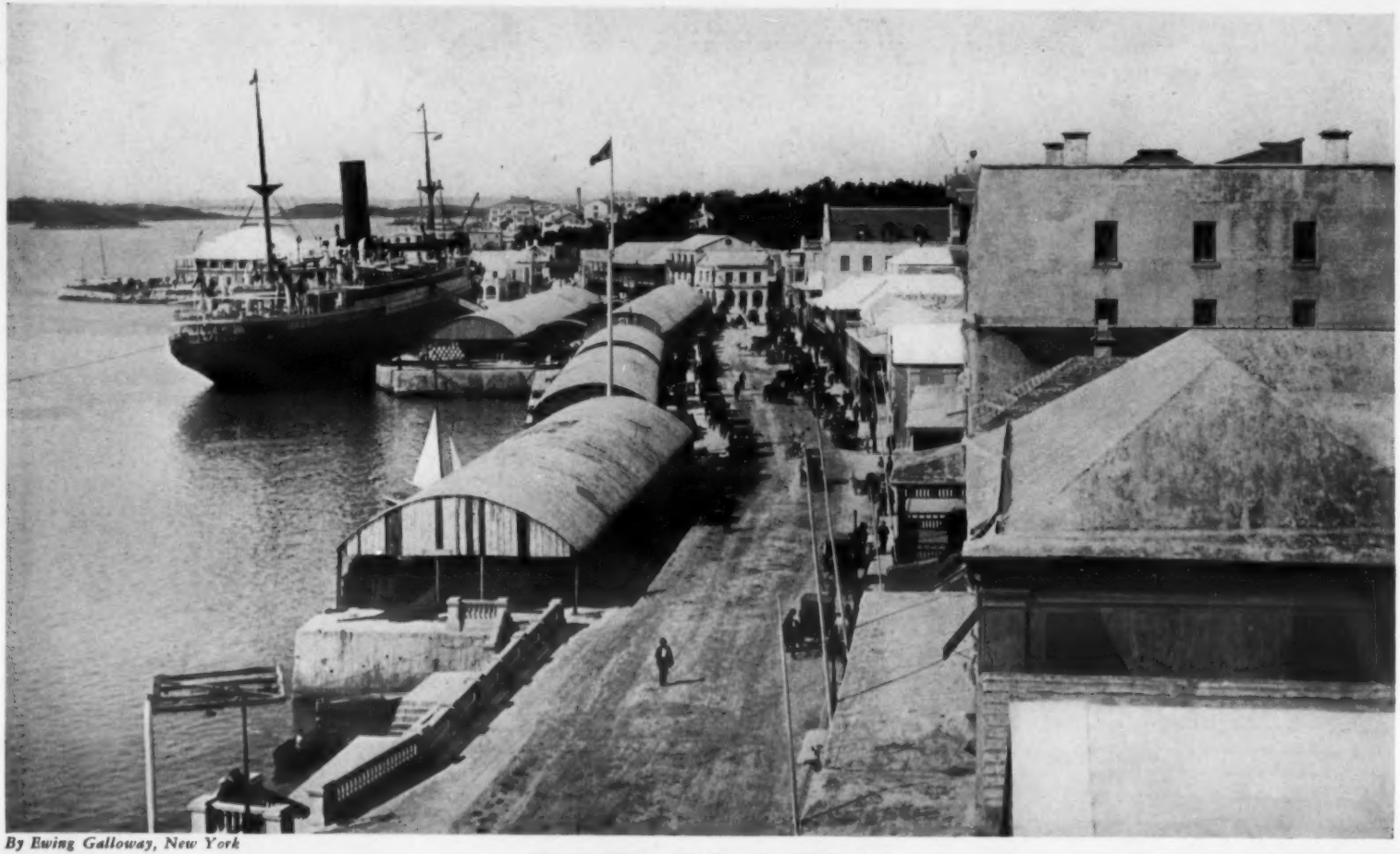

By Ewing Galloway, New York

FRONT STREET, HAMILTON, BERMUDA

By Burton Holmes from Ewing Galloway

AN OLD HOUSE IN BERMUDA—300 YEARS OLD
Eugene O'Neill spends his vacation in this house.

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By Ewing Galloway, New York

HAMILTON HARBOR

By Ewing Galloway, New York

CITY OF HAMILTON

Towers of the Parliament Building, and the post-office to the front.

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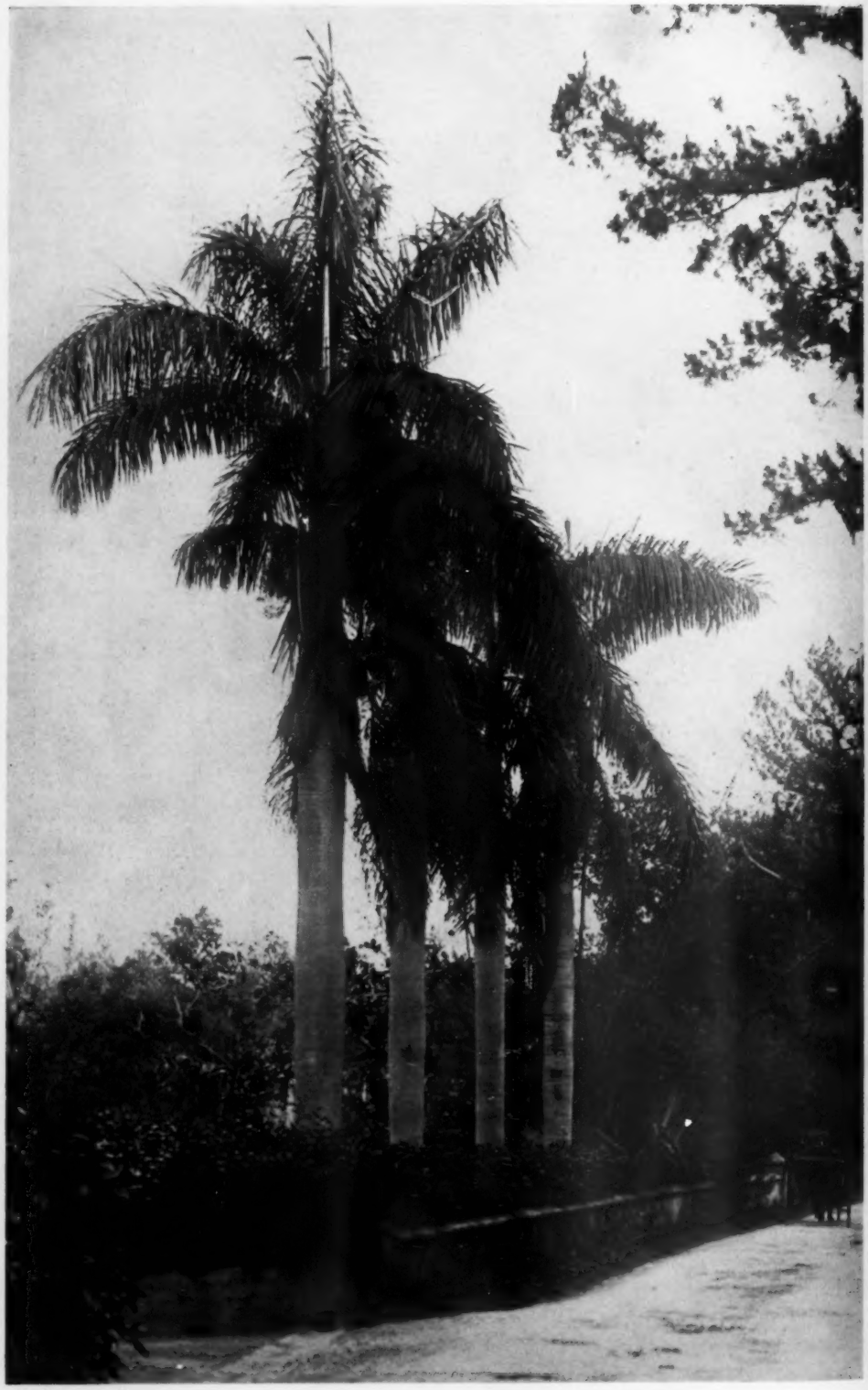

By Ewing Galloway

ROYAL PALMS, BERMUDA

By Burton Holmes from Ewing Galloway

BEAUTIFUL TREE-LINED ROADS SUCH AS THIS HAVE MADE THE ISLANDS OF BERMUDA FAMOUS AS A HEALTH AND PLEASURE RESORT

By Burton Holmes from Ewing Galloway

BERMUDA LILIES

XVI

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CHRISTMAS TIME, NAVAL ACADEMY, ANNAPOLIS, MARYLAND

Pickering Studio, Annapolis

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UNITED STATES
NAVAL INSTITUTE
PROCEEDINGS

Vol. No. 56, No. 12 DECEMBER, 1930 *Whole No. 334*

A Practical Application *of* Navigation *to* Aircraft

By LIEUTENANT (J.G.) H. P. MCLEAN CONNOR, *U. S. Naval Reserve*

OBJECT of flight: To prove the practical application of scientific navigation to aircraft for transoceanic flying.

Our reason for not carrying radio equipment or pontoons was to prove that navigation by dead reckoning and celestial observations could be successfully applied in a practical way without the aid of radio, or being forced to land on the water in order to obtain a clear horizon for observations. Our original plan was to fly to Bermuda one day, land, and return the following day. Upon considering the problem of landing on the island, we concluded that a suitable place for that purpose did not exist there, and so decided upon a nonstop return flight.

Crew: Pilot, Roger Q. Williams; navigator, Lieutenant (J.G.) H. P. McLean Connor, U. S. Naval Reserve; co-pilot, Erroll Boyd.

The *Columbia* was fitted with a small compartment in the rear of the main tank which was used for the navigator's compartment. An observation hatch was cut overhead and fitted with a removable windshield to permit taking observations. Without the aid of this windshield it would have been impossible to hold a sextant steady against the tremendous air stream.

The *Columbia* was fitted with the usual motor instruments. We had three compasses, one earth inductor with dial, one cowling magnetic compass, and one cabin magnetic compass. These compasses were carefully checked for deviation *and at no time were the compasses out of order.*

The flying instruments consisted of one of each of the following: rate-of-climb indicator, turn-and-bank indicator, air-speed indicator, Daiber slow-bubble indicator, Sperry artificial horizon, thermometer, and tachometer.

The lighting system consisted of two separate systems: two dash lights conveniently arranged on dashboard with a rheostat control. Two flash lights (special) for emergency, also for energizing phosphorous material on flight instruments.

The navigational instruments consisted of an octant with a bubble attachment and one aëro chronometer and three hack watches. Where precision in celestial navigation is required, it is essential that chronometers and watches be accurate to the split second. We also carried one nautical almanac and nautical tables as well as one copy of Dreisonstok tables for quick calculations. The aircraft plotting sheet, published by the United States Hydrographic Office, which is specially divided into ten-mile squares, for quick determination of latitude and longitude, was used to good advantage on our flight, with celluloid aircraft plotter, parallel rulers, and dividers. For a chart table I used a ply board 2 by 3 feet, which fitted

CHRISTMAS TIME, NAVAL ACADEMY, ANNAPOLIS, MARYLAND

conveniently on top of the main tank in the after end of the ship, and made an excellent chart table.

Graduated on the stabilizer were drift angle lines for every 5° from 0° to 30° on each side of the fin in order to permit taking accurate drift "sights."

We carried six Coston calcium water lights for checking drift at night. Of these we used only two.

The observations I obtained of the sun were calculated by line-of-position methods, each position obtained being carefully verified and used in conjunction with dead reckoning navigation.

The earth inductor compass dial and artificial horizon were separated from the dashboard by a special rubber mounting to absorb vibrations.

For sanitation purposes the crankcase breathers on the motor were extended by a rubber hose through the cowling to permit gases to escape into the air, thereby keeping fresh air in the cabin. The air vent on the large tank was extended from the roof of the cabin to prevent fumes, and thereby eliminate the possibility of the crew becoming air sick. At intervals of half an hour all windows were opened to permit change of air.

As an aid to night flying and to prevent the exhaust gases from annoying the pilot while flying blind, the exhaust manifolds of the top cylinders were shaped in such a manner as to bring the exhaust flames below the pilot's line of vision.

The right rudder pedal was equipped with a series of elastic bands of different tensile strength, thereby permitting the pilot to fly "hands and feet off" with ease. This ship usually carried right rudder.

As a full measure of safety, a special drain for the carburetor strainer was installed in the cockpit, permitting the pilot to drain it while in flight.

The motor functioned perfectly throughout the entire flight. We carried 333 gallons of gasoline, 12 gallons of oil for lubricating purposes, in addition to 3 single gallons in cans for an emergency. Useful load 2,668 pounds including weight of fuel, three men, and instruments—weight of ship in light condition 2,100 pounds, total weight at take-off 4,768 pounds.

The ground speed of the motor upon warming up was 1,600 r.p.m., with an oil temperature of 40° Centigrade. The take-off was made with a north wind, five to eight miles per hour, barometer 30.14 inches, temperature 69° Fahrenheit.

At 5:01 A.M., 60th meridian time, we slowly started down the 3,800-foot runway. The take-off was in a cross wind, and after running nearly the entire length of the runway, 3,000 feet, we lifted in twenty-four seconds and slowly attained an altitude of 200 feet, with an oil temperature of 48° Centigrade, and turning a maximum r.p.m. of 1,850 in the air.

We set our course for Ambrose Light Vessel, from which we took our departure at 5:17 A.M. Williams throttled the motor back to 1,640 r.p.m. *in order to economize on fuel consumption.* As we passed over Ambrose Light Vessel, we set our course to steer 138° true, which would take us to Gibbs Hill Lighthouse in Hamilton Harbor, Bermuda, a total distance of 657 nautical miles, or 755.56 statute miles. With a northeast wind, force three to four, we were making 11° drift to the right. The weather was fine, with hazy horizon.

After an hour's run, the wind gradually became northwest with light breezes. We were averaging eighty knots, and obtaining our position by observations of the sun. With the change of wind, naturally we had to make an allowance for drift, and we were making our course good.

At 6:00 A.M. we calculated we would pick up the SS. *Fort St. George* on the track, which was southbound, at about 9:25 A.M. About 8:00 A.M. we passed over the northern limit of the Gulf Stream, in latitude 37° 50′ north, 70° 53′ west. There was no noticeable change in the air except for a slight bumpiness at times. The temperature of the air was 83°. A cloud formation of false cirrus and cumulo-stratus. Visibility twenty miles.

At 9:25 A.M. we sighted the SS. *Fort St. George,* and at 9:35 circled her and exchanged courtesies. She saluted us with three blasts of the siren and we returned this salute by three dips of our port wing. As we passed her we sighted the motor ship *Bermuda,* southbound, ten miles to port, or to the left of our course and abeam of us.

We circled the *Fort St. George* twice and then headed directly over her fore-and-aft line. By this method we checked our compasses on the vessel's heading, and as we

left her astern, I obtained another "drift sight," which showed that we were making 8° drift to the right.

By this time the wind had again veered east, force three to four. With an average r.p.m. of 1,600 to 1,625, we were averaging seventy-one knots ground speed. The air-speed indicator registered ninety to ninety-one statute miles. The weather continued fine with some cumulus clouds.

At 10:39 A.M., or 14:39 Greenwich civil time, a line of position by the sun showed us to be twelve miles to the right of our course. Upon calculating our position and verifying it, I changed the course to 133° true (5° to the left) in order to bring us on our track. The fact that we had got off our course twelve miles in such a short space of time served to indicate to me, *with even very careful dead reckoning,* the necessity for obtaining good observations. We continued on this 133° true course until 1:00 P.M., when we were on our original track line, and then hauled the *Columbia* to 137° true, the course to take us to Hamilton Harbor.

By this time the wind had veered from east to southerly and south-southwest, force three to four. This naturally reduced our speed, and we were averaging only about sixty-eight knots. The sky became cloudy and partly overcast with a hazy horizon. The cloud formation was cumulus and cumulo-nimbus, with some flying scud. We were then flying at an altitude of 400 feet, with a visibility of about ten miles.

As we approached the island about 2:00 P.M., the visibility became less and the ceiling lower. The sky was overcast, and we were unable to obtain observations. Thick nimbus clouds were ahead of us, and we commenced to encounter rain squalls, the wind backing to southerly, force four to six, which was just as Dr. Kimball, of the New York office of the United States Weather Bureau, had predicted before the take-off; that is, that we could expect overcast weather with showers around Bermuda in the early afternoon.

By 2:10 P.M. the visibility was less than two miles, and at 2:23 P.M. we sighted the radio towers at Hamilton Harbor. At 2:24 P.M. we arrived over the harbor in a heavy downpour, with a visibility of less than half a mile. Flying between 50 and 150 feet altitude we made a complete circle of the islands. From a twenty-minute aërial survey of the island of Bermuda it was evident that there was no suitable field for landing purposes as there was not a long enough straightaway. For seaplanes the logical anchorage will be Hamilton Harbor, which is a landlocked harbor with a buoyed channel. At 2:43 P.M. Williams dropped the mail sack in the residential section near Hamilton. We later learned that the mail bag was delivered promptly to the postmaster. At 2:44 P.M. we headed for New York.

We set our course to steer 322° true from Gibbs Hill Lighthouse in order to intercept the motor ship *Bermuda,* which was southbound, on the 137°- 317° true steamship track. By 3:00 P.M. we had run out of the bad weather. We continued on this course until 4:06 P.M., or 20:06 Greenwich civil time, when an observation showed us to be slightly to the left of this course. About 4:30 P.M. we passed over the southern limit of the Gulf Stream and, as with our experience in the morning, there was no appreciable change in the air. The wind was east-southeast, force three to four, and we were allowing 6° to 7° for drift. The weather was fine with cirrus and cirro-cumulus cloud formation.

I neglected to add that on commencing our homeward-bound trip, Williams stepped her up to 1,675 r.p.m., and, with the aid of favorable winds, we were averaging ninety-five knots ground speed, or between 108 and 110 statute miles per hour.

At 5:00 P.M. we sighted the *Bermuda* slightly on our starboard bow as we had expected, and at 5:06 P.M. circled her, accompanied by the usual exchange of courtesies and salutes. Similarly as with the *Fort St. George,* we headed directly over her fore-and-aft line and obtained a good check on our compasses. As we were then on the regular direct line, we changed our course to 317° true, which would bring us into Ambrose Light Vessel. Subsequent observations showed us to be making this course good, and accompanied by easterly and southeasterly winds, force three to four, we were stepping right along at ninety-five to ninety-six knots ground speed.

We passed over the northern limit of the Gulf Stream about 7:30 P.M. and the temperature of the air gradually dropped from 78° to 74°. We were flying at an altitude between 500 and 800 feet.

At 7:56 P.M. we sighted the SS. *Fort St.*

George dead ahead and at 8:04 P.M. passed her to starboard. This time we did not circle the vessel as night was coming on and we were anxious to avoid as much "blind flying" as possible. We passed the vessel on her port side with her siren blowing three blasts in salute and Williams giving the *Columbia* three quick dips of our port wing in return. In each instance that we circled the vessels we flew alongside the boat deck and were able plainly to see the passengers.

The sun set about 8:30 P.M. and with cumulus clouds around the horizon, the horizon gradually melted. We climbed to 2,500 feet altitude as a safety precaution for "blind flying."

As darkness approached, the artificial horizon rendered good work and aided us considerably. This instrument is an invaluable aid to night flying over the ocean as it records the plane's actual altitude in flight relative to the horizon, and enables the pilot to maintain normal flight.

A low haze covered the sea and at 9:40 P.M. we sighted Navesink Lighthouse off the Highlands. We could not distinguish Ambrose Light Vessel until we were right over it. At 9:44 P.M. our sea passage ended and we made a bee line for Roosevelt Field. The visibility then was less than five miles, and a ground fog was rolling in from the sea. We were able to discern the lights of Long Island in places and at 9:55 arrived over Roosevelt Field. Williams "jazzed" the motor as a signal for the attendants to put on the flood lights. We were unable to make out the lights on the water tower which is 200 feet high, due to the ground fog, and so we decided it was unwise to land under these conditions.

We headed for Curtiss Field, Valley Stream, where fortunately the flood lights happened to be on, and at 10:03 P.M. Williams made a perfect landing, successfully ending our nonstop flight from Roosevelt Field to Valley Stream, Long Island, via Bermuda, in seventeen hours and two minutes.

Summing up, our average speed southbound was 72.2 knots ground speed, or 83 miles per hour, and northbound, 93.86 knots ground speed, or 108 miles per hour. The air during the whole flight was exceptionally smooth. As far as the flight was concerned, it seemed little different to me from sailing in a fast surface vessel.

Our average fuel consumption southbound was 12 gallons per hour; northbound, 14 gallons per hour. We landed at Curtiss Field *with a reserve of 120 gallons of gasoline* (equivalent to a weight of 720 pounds), sufficient to remain aloft another twelve hours if necessary.

The total round trip distance from Roosevelt Field was 1,358 nautical miles, or 1,561 statute miles. We obtained photographs of each vessel we passed and one good "shot" of Bermuda.

The navigation of aircraft is fundamentally the same as that of surface vessels, the difference being the greater speed of the former, and the wind drift or leeway to which an airplane is subjected, making it necessary to apply slightly different methods in which accuracy and speed in calculating one's position are essential.

In ocean flying a thorough knowledge of meteorology and seamanship is also necessary. This, of course, is obtained only from years of experience at sea.

Contrary to the general opinion among even experienced navigators that aërial navigation need not be as accurate as surface vessel navigation, it has been my experience that aërial navigation should be as accurate, if not more accurate, than nautical navigation, especially when endeavoring to hit your point of destination "on the nose." Those men who have flown in low visibility will appreciate these facts.

The observations of the sun were taken by the bubble octant. Briefly, I applied nautical navigation in a practical way on this flight. This was the ultimate result of some three years of experimentation in applying navigation in aircraft (both dead reckoning and navigation by astronomy). The average time of taking each observation, including opening of hatch, noting time, and altitude obtained, was one minute, ten seconds.

I was most impressed by the realization of how disaster overtakes inexperienced flyers over the water when I realized that the most dangerous time of the flight is the first hour after sunset, as the darkness compels the pilot to rely solely on his instruments to maintain normal flight. In this connection only pilots who have had a large amount of instrument flying should be permitted to attempt ocean flights where so-called "blind flying" is involved.

The success or failure of any venture de-

pends entirely on careful and minute preparation. These preparations include careful selection of crew, plane, motor, as well as exact and reliable instruments, and supervision by experienced mechanics and ground crew.

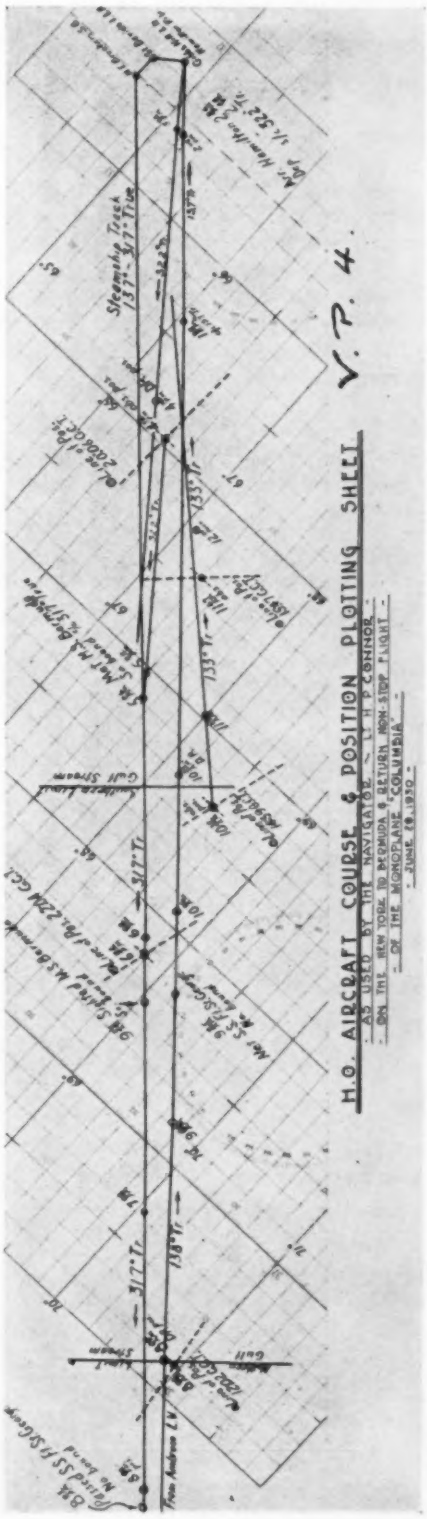
I want to point out the necessity for perfect team work and coöperation of each member of the crew, which in our case made our flight successful. The careful steering of the compass courses by the pilots was necessary in order to aid in making our courses good, and I wish to pay a warm tribute to Roger Williams and Erroll Boyd for their perfect coöperation.

On our (Williams' and mine) numerous cross-country flights in which we applied navigation, we frequently arrived at our destination within the short period of thirty seconds of our estimated time.

These facts, coupled with our Bermuda flight, we believe put aërial navigation on a par with nautical navigation for accuracy and dependability. We have further experiments to conduct in perfecting the practical application of navigation to aircraft, for the use of experienced ocean navigators in applying their talents to aërial navigation.

I recommend either the use of *H.O. Publication Number 208* or Weems' method of navigation for calculating lines of position. Suggested improvement in *H.O. Publication Number 208:* That a table containing sun's and moon's refraction and parallax combined be inserted in this publication for use of the navigator using a bubble octant with reference to the artificial horizon. (The present altitude correction is a total correction with an allowance for the height of the eye, given only for use of the visible horizon.)

Obviously for a regular transoceanic air line, large flying boats with seaworthy hulls will be the practical ship of the future. These vessels, of course, will be equipped with radio for communication purposes and as a safety measure. It is my opinion that radio has not been developed to a point where it can supersede, or where it can be anything more than an aid to navigation in the event of emergency. The ideal set for transoceanic flying ships would be an intermediary, or short-wave set, for two-way communication between plane and shore. With a short wave and high frequency set, the radio operator would be able to obtain



radio bearings from a radiocompass station on the ground or surface vessels, but due to the contour of the land and the curvature of the earth and varying atmospheric conditions, these circumstances must be taken into consideration when using this means as an aid for navigation. The practical use of the radio will be to send out position reports and to obtain weather data for safety precautions.

The present radio beacons in use over the land have a range of not over 150 miles, and this distance only in good atmospheric conditions. One of these installed at Hamilton Harbor and another at or near Sandy Hook, New Jersey, would be of some assistance for New York to Bermuda air lines, but should not be relied upon implicitly.

I understand that experiments are now being conducted for a direction finder to be installed in aircraft, similar to those used in naval vessels and large ocean liners. But as in the case of surface craft, they should be used only as an aid to navigation.

In connection with this I have conferred with Radio Corporation of America officials and they confirm this opinion with regard to the use of radio for transoceanic flying. As an aid to the future enhancement of aviation, it is suggested that there should be government supervision of contemplated ocean flights and that for the present only navigators who have had a number of years' service as line officers in the Navy or Merchant Marine be permitted to act in such capacity.

EXAMPLE OF OBSERVATION OBTAINED BY BUBBLE OCTANT ON NONSTOP FLIGHT OF MONOPLANE "COLUMBIA", NEW YORK—BERMUDA, 29 JUNE 1930

Position Line (Sun)

W		Date	June 29, 1930
C-W		D. R. Lat.	35 20 N
Chro.	14 35 55	D. R. Long.	68 08 W
c.c.	+ 1 50	Long. in time	
G. C. T.	14 37 45	(Naut) dec.	23 15 5 +
		(Alm) Eq. T.	— 3 09
G. C. T.	14 37 45	Obs. Alt.	
Eq. T.	— 3 09	I. C.	
G. A. T.	14 34 36	App. Alt.	
Sub. 12 hrs.		Table A and B	
G. H. A.	2 34 36	True Alt.	
Arc	38 39 (—) West	Obs. Alt.	61 29 bubble octant
Ass. Long.	68 39 (+) East	O. R. and P.	— 00.5
L. H. A.	30°	True Alt.	61 28.5 h.o.

t 30°) dec.	23° 15′ 5 +	A 3987	C 388	Z′ 71° 7
Ass. Lat. 35) b	51 02 6 +	B 1651	D 9449	Z″ 34 5
d-b	74 18 1	A+B 5638	C+D	Z 106 2° ø
		(Computed Alt.)		(Azimuth)

Computed Alt.	61 26	
True Alt.	61 28.5	
"a"	+02.5	Towards Z

Pos. by obs. at 10:38 A.M.
Lat. 35 20 N } as plotted on H.O. Aviation
Long. 68 28 W } Plotting Sheet VP-4

NAVIGATION LOG OF MONOPLANE COLUMBIA

BERMUDA [HAMILTON HARBOR] TO NEW YORK [VALLEY STREAM, L.I.] NON-STOP

LOG KEPT ON 60TH MERIDIAN TIME

SUNDAY 29TH JUNE 1930
NAVIGATOR - LT. H.P. CONNOR U.S.N.R.

MEAN VARIATION 11° WEST
DEVIATION { EARTH INDUCTOR 5° EAST / SEAT MAG. 2° WEST

HOUR DAYLIGHT SAVING TIME	LATITUDE NORTH	LONGITUDE WEST	COURSES TRUE	COURSES PER STANDARD COMPASS: EARTH INDUCTOR COMPASS	COURSES PER STANDARD COMPASS: SEAT MAGNETIC COMPASS	WIND DIR.-FORCE	DRIFT	AIR SPEED STATUTE	GROUND SPEED KNOTS	TEMPERATURE AIR-FAHR	TEMPERATURE OIL-CENT	VISIBILITY (Miles)	ALTITUDE (Feet)	R.P.M.	REMARKS - WEATHER CONDITIONS - CLOUD FORMATIONS - ETC.
3 P.M.	32°-35'	65°-07'	Set Course 322°	323°	330°	SSW-3-4 / SSW-4	-5°	95	95	80°	71°	1'-2' / 2'-5'	50' / 200'	1650	2.45 P.M. Departure HAMILTON - Set Course 322° True, 323° Per Standard Compass - Passing Showers - Low Ceiling - Cumulus - Nimbus
4 P.M.	33°-50'	66°-17'	322°	328°	335°	SSW-3 / Sly-1	-5° / 0°	97	95	84°	73°	10'	800' / 400'	1675	Cumulus - Some Scud - 4.12 P.M. Passed Over Gulf Stream - Cloudy & Hazy - Fine
5 P.M.	35°-02'	67°-30'	322° / 5.52 P.M. Change Course	331° / 334°	338° / 341°	Variable Winds-1 / ESE-2-3	+3° / +6°	98	95	83°	73°	15' -	400'	1675	Passing Showers - Cumulus Nimbus - Air Slightly Bumpy - Overcast - 5.22 P.M. Sighted M.S. BERMUDA Ahead
6 P.M.	36°-09'	68°-44'	317° / 317°	330° / 329°	337° / 336°	East-3-4	+7° / +6°	100	90 / 93	82°	73°	20'	400'	1675	5.22 P.M. Circled Vessel 218 Miles Out Of Bermuda South-bound - Exchanged Courtesies - Change Course 317° True - 330° Per Standard Compass
7 P.M.	37°-18'	70°-03'	317°	328° / 327°	335° / 334°	East-3-4 / East-3	+5° / +4°	101	96	78°	72°	20'	500'	1675	Cloudy - Fine - Cumulus - 7.12 P.M. Part Cloudy & Fine - Cirrus & Cirro-Cumulus
8 P.M.	38°-27'	71°-25'	317°	326° / 323°	333° / 330°	ESE-3 / SE-2	+3° / 0°	101	95	74°	71°	30'	2000'	1675	Cumulus - 7.32 P.M. Sighted S.S. FORT ST GEORGE North-bound 8.05 P.M. Passed S.S. FORT ST GEORGE - Exchanged Courtesies - Fine & Clear
9 P.M.	39°-37'	72°-48'	317°	323° / 319°	330° / 326°	SE-2 / SSW-1-2	0° / -4°	100	95	72°	70°	10'	2500'	1675	Climbed to 2500' Altitude As Night Approached - Cloudy Around Horizon
10 P.M.	Ambrose Light Vessel 40°-27'	73°-49'	317°	317°	324°	SW-2-3	-6°	101	94	70°	68°	5' / 1'	2500'	1675	Cumulus - Hazy - 9.48 P.M. Arrival AMBROSE LIGHT VESSEL [End Of Sea Passage]

Running Time [Gibbs Hill Light House to Ambrose Light Vessel] 7 Hours 00 Minutes
Average Ground Speed - 93.86 Knots Per Hour
Average Ground Speed - 108.00 Miles Per Hour
Average Fuel Consumption 14 Gallons Per Hour North Bound
Total Flying Time - 17 Hours 32 Minutes
Time Circling Bermuda - 20 Minutes
Total Fuel Consumption For Round Trip - 213 Gallons
Total Fuel Received - 333 Gallons
Total Fuel Remaining On Hand - 120 Gallons

Ground Fog Setting In - 9.18 P.M. Circled Roosevelt Field - Unable To Distinguish Lights Proceeded To Valley Stream & Landed At 10.12 P.M. Barometer 30.11" - Foggy
Distance [Gibbs Hill Light House To Ambrose Light Vessel] 657 Nautical Miles - 755.56 Statute Miles

[Signed] Harry P. Connor
[Navigator]

NAVIGATION LOG OF MONOPLANE "COLUMBIA"

NEW YORK [ROOSEVELT FIELD] TO BERMUDA [HAMILTON HARBOR] NON-STOP
[NO RADIO EQUIPMENT] LOG KEPT ON 60TH MERIDIAN TIME

SUNDAY 29TH JUNE 1930
NAVIGATOR LT H.P CONNOR U.S.N.R

MEAN VARIATION 11° WEST
DEVIATION — EARTH INDUCTOR 5° EAST / SEAT MAG. 15° EAST

HOUR DAYLIGHT SAVING TIME	LATITUDE NORTH	LONGITUDE WEST	COURSES TRUE	COURSES PER STANDARD COMPASS — EARTH INDUCTOR COMPASS	COURSES PER STANDARD COMPASS — SEAT MAGNETIC COMPASS	WIND DIR	WIND FORCE	DRIFT	AIR SPEED STATUTE	GROUND SPEED KNOTS	TEMPERATURE AIR-FAHR	TEMPERATURE OIL-CENT	VISIBILITY (Miles)	ALTITUDE (Feet)	R.P.M.	REMARKS WEATHER CONDITIONS CLOUD FORMATIONS
5 PM	AMBROSE LIGHT VESSEL		138°	135°	125°	ENE	3-4	-11°	91	77	69°	48°	20'	200'	1640	4 PM WARMING UP 5 PM TAKE OFF IN 24 DEGREE F. 30.14 5 1/2 PM DEPARTURE AMBROSE LIGHT VESSEL - SET COURSE 138° TRUE 135° PER STANDARD COMPASS - PREV CLOUDY SKY HORIZON FOG
											73°	52°				
6 PM	39°-46'	73°-00'	138°	135°	125°	ENE	3-4	-11°	88	80	74°	66°	15'	250'	1600	CIRRUS & CIRRO-STRATUS - FLYING SCUD - FINE & CLEAR CLOUDY AROUND HORIZON -
				143°	155°	VARIABLE	1	-1°			75°	67°				
						NW	2									
7 PM	38°-49'	71°-54'	138°	144°	136°	CALM	0	0°	90	82	78°	69°	20'	350'	1625	CIRRO STRATUS - STRATO CUMULUS - AIR SMOOTH - FINE & CLEAR -
				145°	137°	NW	1-2	+1°								
8 PM	37°-50'	70°-55'	138°	141°	139°	WNW	1-2	+3°	88	82	85°	72°	20'	500'	1600	8 PM OVER NORTH LIMIT OF GULF STREAM - AIR SLIGHTLY ROUGH AT TIMES - FALSE CIRRUS - STRATO CUMULUS -
				147°	139°											
9 PM	36°-49'	69°-46'	138°	138°	130°	E/E	2	-6°	90	74	83°	72°	20'	1000'	1625	CIRRO STRATUS - FINE - CLEAR - 9 PM SIGHTED FORT ST GEORGE AHEAD - 9 PM MET SS FORT ST GEORGE NORTH BOUND
10 PM	35°-55'	68°-47'	138°	136°	128°	EAST	3-4	-8°	91	71	82°	72°	20	800'	1640	EXCHANGED COURTESIES - MOTOR SHIP BERMUDA SOUTH BOUND A BEAM 10° TO PORT - CLEAR SKY - CHOPPY SEA -
11 PM	34°-38'	68°-00'	CHANGE COURSE 135°	136°	128°	EAST	4	-8°	90	70	83°	72°	20'	600'	1625	11 PM CHANGE COURSE 135° TRUE 136° PER STANDARD COMPASS CIRRO-CUMULUS & SOME CUMULUS - AIR SMOOTH - PASSED OVER SOUTH LIMIT OF GULF STREAM -
				136°	128°	VARIABLE	1	-3°		73						
12 MIDN	34°-13'	67°-05'	135°	139°	135°	CALM	0	0°	90	76	85°	73°	15'	420'	1625	CLOUDY - FLYING SCUD - HAZY AROUND HORIZON - CUMULUS NIMBUS -
				140°	132°	S'LY	1-2	+1°		73						
1 AM	33°-25'	66°-03'	CHANGE COURSE 137°	147°	139°	SSW	2-3	+4°	90	69	84°	73°	10'	500	1625	1 AM CHANGE COURSE 137° TRUE 147° PER STANDARD COMPASS - CLOUDY & FIRT OVER CAPE - SHOWERS IN VICINITY - HAZY -
						SSW	3-4	+4°		68						
2 AM	32°-35'	65°-10'	137°	149°	141°	S'LY	4	+6°	88	66	78°	70°	2'	200'	1600	LOW CEILING & POOR VISIBILITY - PASSING SHOWERS - 2 AM SIGHTED RADIO TOWERS -
											76°	68°	1-2	100'		
														50'		

RUNNING TIME [AMBROSE LIGHT VESSEL TO GIBBS HILL LIGHT HOUSE] 9 HOURS 07 MINUTES
AVERAGE GROUND SPEED - 72.2 KNOTS PER HOUR
AVERAGE GROUND SPEED - 83 MILES PER HOUR
AVERAGE FUEL CONSUMPTION 12 GALLONS PER HOUR SOUTH BOUND
ENGINE THROTTLED DOWN FOR FUEL ECONOMY ON SOUTH BOUND TRIP
TOTAL FUEL RECEIVED 333 GALLONS - 1998 LBS — TOTAL USEFUL LOAD 2668 LBS
TOTAL LUBE OIL RECEIVED 12 GALLONS — TOTAL WEIGHT AT TAKE OFF 4768 LBS

2 PM ARRIVED HAMILTON HARBOR - HEAVY RAIN SQUALLS - CIRCLED ISLAND OF BERMUDA - 2 PM DROPPED MAIL & CABLE GRAMS - 2 PM DEPARTURE HAMILTON HARBOR NORTH BOUND DISTANCE [AMBROSE LIGHT VESSEL TO GIBBS LIGHT HOUSE] 657 NAUTICAL MILES - 755.56 STATUTE MILES. —

SIGNED _____
NAVIGATOR

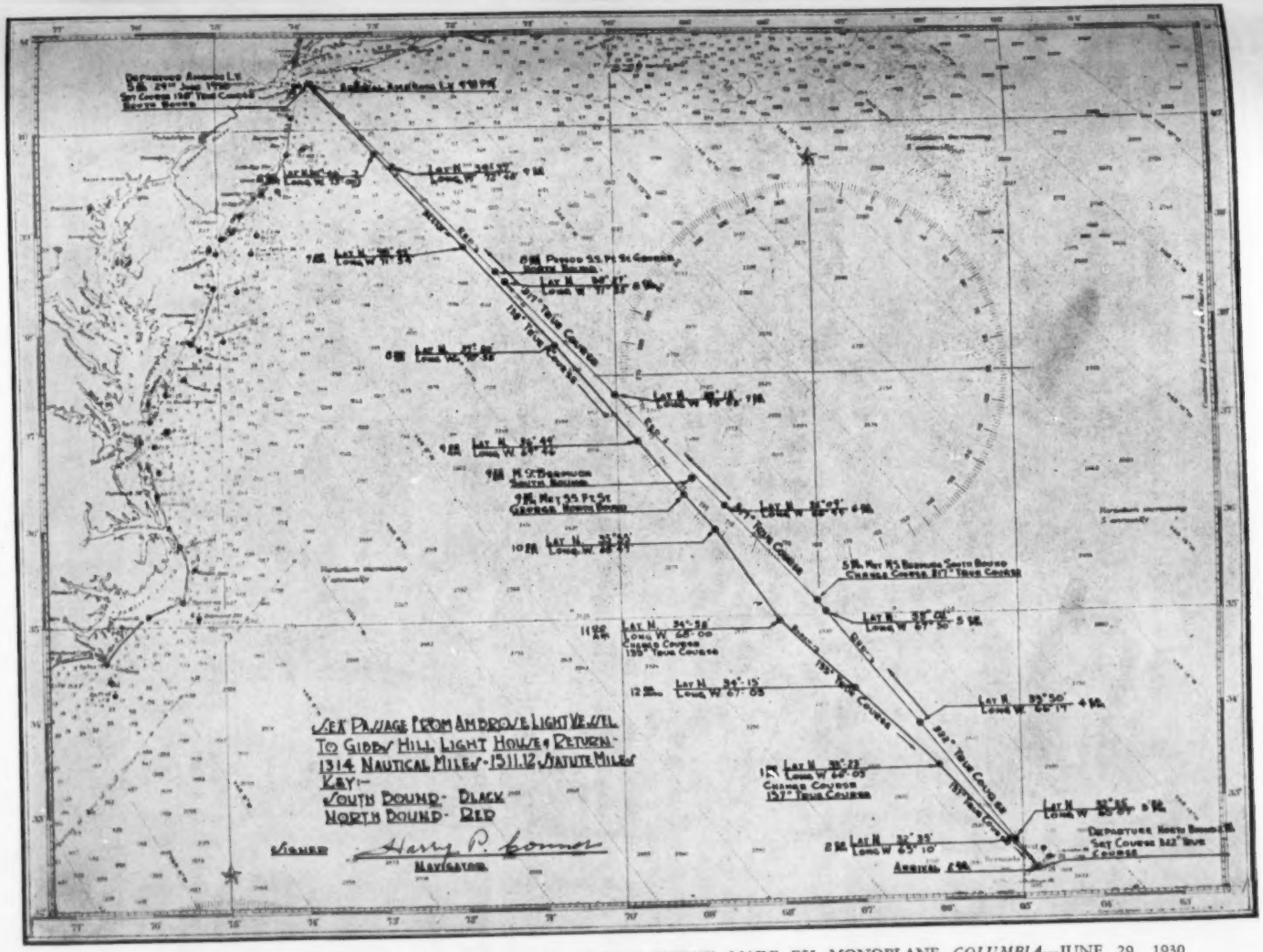


CHART OF NEW YORK—BERMUDA AND RETURN NONSTOP FLIGHT MADE BY MONOPLANE *COLUMBIA*—JUNE 29, 1930
Showing courses steered and hourly positions.

Permissible Building Programs *under the* London Naval Treaty

By LIEUTENANT COMMANDER HOMER N. WALLIN *(C.C.), U. S. Navy*

TO MANY AMERICAN citizens, the ratification of the London Naval Treaty constitutes gratifying evidence of substantial progress in the effort to prevent war. To many others, the ratification of the treaty represents a sacrifice of our naval defense so far-reaching as to dangerously imperil the national security if war should come.

Prior to ratification, the Senate and its committees on foreign relations and naval affairs, respectively, conducted extensive investigations of problems surrounding naval defense. Although there was serious difference of opinion as to the merits and demerits of the London treaty, it appears obvious that the Navy's problem is better understood and appreciated by the Congress and the country at large than at any time in recent years. This favorable viewpoint will no doubt find expression in the carrying forward of a reasonable building program in accord with the terms of the treaty. For this reason there is more than a normal desire for information as to the permissible building programs for the three nations which have signed the agreement.

As regards the construction of new vessels, the treaty is very definite as to restrictions and permissions. New ships of the various categories may be built: (a) if the total tonnage of the category built or building is below the treaty limit; or (b) as replacements for vessels becoming "over age" during the life of the treaty; or (c) when specifically allowed, although not meeting the stipulations given in (a) and (b) above.

Before taking up the details of the permissible building program for each category of vessel, it would be desirable first to tabulate the allowable tons (2240 pounds) of standard displacement in the various categories for each nation. Such a tabulation clearly defines the relative proportions of the combatant navies as established by the treaty.

While Table I below gives the allowed

TABLE I.—TREATY ALLOWANCE OF COMPLETED TONNAGE.
(Not to be exceeded on December 31, 1936)

	United States		Great Britain		Japan		
	No.	Tonnage	No.	Tonnage	No.	Tonnage	Ratio
Capital ships	15	462,400*	15	474,750	9	266,070	60%
Aircraft carriers		135,000		135,000		81,000	60%
Cruisers—over 6.1″ guns	18	180,000†	15	146,800	12	108,400	60%
Cruisers—6″ guns & under		143,500		192,200		100,450	70%
Destroyers		150,000		150,000		105,500	70%
Submarines		52,700		52,700		52,700	100%
Total		1,123,600		1,151,450		714,120	
Ratios		100%		102.4%		63.5%	

* The anticipated modernization of eight battleships will increase their displacements approximately 3,000 tons each.

† In lieu of 180,000 tons of 8-inch gun cruisers, the United States has the option of building 150,000 tons of 8-inch gun cruisers and an additional 45,500 tons of 6-inch gun cruisers. Due to the restrictions of the treaty, 20,000 tons of the 8-inch gun cruisers cannot be completed until after December 31, 1936; 10,000 tons can be completed any time in 1937, and the remaining 10,000 tons any time in 1938.

tonnages for each nation, it should be understood that these figures represent completed tonnages only, and do not include vessels under construction for replacement purposes. In connection with reduction of tonnages, vessels which cause the total tonnage in any category to exceed the figures given must be disposed of gradually prior to December 31, 1936. This means that a nation may retain its surplus in any category approximately as it chooses, but not beyond the time limit stated. In the case of the battleships to be scrapped, however, they must be disposed of within definite time limits; the first within twelve months; the second within eighteen months, etc.

Rules for replacement. The treaty establishes definite age limits for the various types of ships, and permits replacement of those becoming "over age" during its life. These age limits are as follows:

(a) For Capital Ships and Aircraft Car-

TABLE II.—AIRCRAFT CARRIERS.*

	United States Tonnage	Great Britain Tonnage	Japan Tonnage
Built or laid down, but experimental	10,286†	70,350†	7,470†
Built or laid down, against treaty limit	66,000	45,000	61,400
Total built or laid down	76,286	115,350	68,870
Treaty allowance	135,000	135,000	81,000
Amount below treaty allowance	58,714	19,650	12,130
Can be laid down as new construction	58,714	19,650	12,130
Can be laid down as replacements	10,286	70,350	7,470
Total new construction and replacements to 1936, inclusive	69,000	90,000	19,600

* Not covered by the London treaty as the Washington treaty limits this class of vessel.

† Under terms of the Washington treaty, this tonnage is considered experimental and is replaceable without regard to age.

TABLE III.—CRUISERS.

Over 6-inch guns	United States Tonnage	Great Britain Tonnage	Japan Tonnage
Treaty allowance	180,000	146,800	108,400
Built or laid down	130,000	186,226	108,400
Can be laid down as new construction	50,000*	None	None
Can be laid down as replacements	None	None	None
Total new construction and replacements to 1936, inclusive	50,000	None	None

* 20,000 tons may be laid down immediately; 10,000 tons in 1934; 10,000 tons in 1935, and 10,000 tons in 1936. Only 30,000 tons may be completed to 1936, inclusive.

6-inch guns and under	United States Tonnage	Great Britain Tonnage	Japan Tonnage
Treaty allowance	143,500	192,200	100,450
Built or laid down	70,500	177,685	98,415
Can be laid down as new construction	73,000	14,515	2,035
Can be laid down as replacements	14,100*	162,835†	51,810‡
Total new construction and replacements to 1936, inclusive	87,100	177,350	53,845

* Not to be completed until 1939.

† Only 91,000 tons may be completed to 1936 inclusive.

‡ Only 35,655 tons may be completed to 1936 inclusive.

Note: The treaty allows each country to fit 25 per cent of its total cruiser tonnage with flying-on decks for aircraft.

TABLE IV.—DESTROYERS.

	United States Tonnage	Great Britain Tonnage	Japan Tonnage
Treaty allowance	150,000	150,000	105,500
Built or laid down	226,313	184,371	122,575
Can be laid down as new construction	None	None	None
Can be laid down as replacements	150,000	120,689	36,965
Total new construction and replacements to 1936, inclusive	150,000*	120,689†	36,965‡

* A total of about 135,000 tons may be laid down immediately, and the total 150,000 tons may be completed to 1936 inclusive.
† Only a total of 117,729 tons may be completed to 1936 inclusive.
‡ Only a total of 26,565 tons may be completed to 1936 inclusive.

riers—None specified as no such ship is considered to become "over age" during the life of the treaty.

(b) For Cruisers—Twenty years unless laid down before January 1, 1920, in which case it is sixteen years.

(c) For Destroyers—Sixteen years unless laid down before January 1, 1921, in which case it is twelve years.

(d) For Submarines—Thirteen years.

Vessels which are built for replacement purposes may be laid down sufficiently early to be completed at the time the vessels to be replaced become "over age." Keels of replacement tonnage cannot, however, be laid down before certain specified time limits prior to the year in which the vessels to be replaced become "over age." These time limits are: (a) Cruisers—three years, (b) destroyers—two years, (c) submarines—three years.

As an example of the operation of the rules for replacement, consider a cruiser completed in 1923 but laid down prior to January 1, 1920. As its age limit is sixteen years, it becomes "over age" in the calendar year 1939, and, as its permissible building period is three years, it can be laid down during the calendar year 1936.

Construction and replacement of vessels. Any study of building programs should take into account the tonnages which may be completed during the life of the treaty as well as the tonnages which may be laid down. In the foregoing tabulations showing the permissible building programs by categories, the figure entered opposite "Total construction and replacements" is the sum of all tonnages which can be laid down to 1936 inclusive, regardless of date of completion. Appropriate footnotes are appended to the tables to give more complete information where this is available, especially as to portion of tonnages which may be completed to 1936 inclusive. The tonnages entered opposite "Built or laid down" do not include vessels which are now listed for sale; such vessels are not regarded as a part of present naval forces.

Capital ships. The signatory nations

TABLE V.—SUBMARINES.

	United States Tonnage	Great Britain Tonnage	Japan Tonnage
Treaty allowance	52,700	52,700	52,700
Built or laid down	64,860	60,284	77,842
Can be laid down as new construction	None	None	None
Can be laid down as replacements	39,930	25,086	19,200
Total new construction and replacements to 1936, inclusive	39,930*	25,086†	19,200‡

* A total of about 6,000 tons may be laid down immediately, and a total of 25,100 tons may be completed to 1936, inclusive.
† Only a total of 18,691 tons may be completed to 1936, inclusive.
‡ Only a total of 12,000 tons may be completed to 1936, inclusive.

agreed not to lay down any capital ships during the years 1931 to 1936, inclusive.

Auxiliary vessels. Vessels of the train or the base force which are employed other than as fighting ships are exempt from limitation, if they have none of the following characteristics:

(a) Mount a gun above 6.1-inch caliber.

(b) Mount more than four guns above 3-inch caliber.

(c) Are designed or fitted to launch torpedoes.

(d) Are designed for a speed greater than twenty knots.

(e) Are protected by armor plate.

(f) Are designed or fitted to launch mines.

(g) Are fitted to receive airplanes on board from the air.

(h) Mount more than one airplane launching apparatus on the center line, or two, one on each broadside.

(i) If fitted with any means of launching airplanes into the air, are designed or adapted to operate at sea more than three airplanes.

While the above restrictions somewhat limit the characteristics of auxiliary vessels, it will be seen that there remains almost complete freedom to proceed with construction of this class of vessel if they are not essentially combatant ships.

Additional provisions affecting construction. The treaty contains a number of additional provisions bearing on the construction of vessels, as follows:

(a) No limitation whatever on surface combatant vessels of 600 tons and under.

(b) No limitation on surface combatant vessels exceeding 600 tons but not exceeding 2,000 tons if they: (1) mount no gun over 6.1-inch caliber; (2) mount no more than four guns over 3-inch caliber; (3) are not designed or fitted to launch torpedoes; or (4) are not designed for a speed over twenty knots.

(c) Capital ships accidentally lost or destroyed may be replaced.

(d) No submarine exceeding 2,000 tons may be constructed.

(e) Destroyers may not exceed 1,850 tons.

(f) Not more than 16 per cent of the allowed total destroyer tonnage shall be employed in vessels of over 1,500 tons.

(g) Up to 25 per cent of the allowed total tonnage in the cruiser category may be fitted with landing-on platforms or decks for aircraft. (About 80,900 tons.)

(h) The allowed total destroyer tonnage may be increased by 10 per cent by transfer from the allowed total tonnage of small-gun cruisers, and vice versa.

Total tonnage that may be laid down. Except for types of vessels not limited, Table VI consolidates the foregoing tables for individual types of vessels and shows the total tonnages by categories that can be laid down by the United States, Great Britain, and Japan to December 31, 1936, inclusive.

A similar comparison of the tonnages which may be completed to 1936 inclusive gives a somewhat different result as shown in Table VII.

Relative Newness of Navies in 1936

Tables VI and VII show that the permis-

Table VI.—Comparison of Total Tonnages by Categories that may be Laid Down by United States, Great Britain, and Japan to 1936, Inclusive.

	United States		Great Britain		Japan	
	Tonnage	Ratio*	Tonnage	Ratio	Tonnage	Ratio
Capital ships	None		None		None	
Aircraft carriers†	69,000	100%	90,000	130%	19,600	28.4%
Cruisers:						
Over 6″ guns	50,000	100%	None	0	None	0
6″ guns & under	87,100	100%	177,350	204%	53,845	61.2%
Destroyers	150,000	100%	120,689	80.4%	36,965	24.7%
Submarines	39,930	100%	25,086	62.7%	19,200	48.0%
Total	396,030	100%	413,125	104.4%	129,610	32.7%

* Means ratio of permissible building programs to indicate relative programs permissible to each country. Tonnage that U. S. may construct is taken as 100 per cent.

† Limitation in accordance with Washington treaty and not affected by London treaty.

TABLE VII.—COMPARISON OF TOTAL TONNAGES BY CATEGORIES THAT MAY BE COMPLETED BY UNITED STATES, GREAT BRITAIN, AND JAPAN TO 1936, INCLUSIVE.

	United States		Great Britain		Japan	
	Tonnage	Ratio*	Tonnage	Ratio*	Tonnage	Ratio*
Capital ships	None		None		None	
Aircraft carriers	69,000	100%	90,000	130%	19,600	28.4%
Cruisers:						
Over 6″ guns	30,000	100%	None	0	None	0
6″ guns & under	73,000	100%	91,000	124.6%	35,655	48.9%
Destroyers	150,000	100%	117,729	78.1%	26,565	17.7%
Submarines	25,100	100%	18,691	74.0%	12,000	47.6%
Total	347,100	100%	317,420	91.5%	93,820	27.1%

* Tonnage that U. S. may complete is taken as 100 per cent.

sible building program of the United States is approximately equal to that of England and far greater than that of Japan. As between the United States and England, the United States has the advantage in large-gun cruisers, destroyers, and submarines, while England has the advantage in small-gun cruisers and aircraft carriers (this last by virtue of the Washington treaty and not the London treaty). On the assumption that our country undertakes a building program at least approximating its permissible program, it is clear that our Navy will be relatively newer and presumably more modern than the Navy of Japan at the conclusion of such a program. The extent of such newness can be measured by comparing the newly constructed tonnages with the total allowed tonnages in each category. The accurate basis of computation would be to total up the tonnages of all vessels to be completed between 1930 and 1936, inclusive, and apply such figures to the total allowed tonnages. This method is not available to us because we have no established program of building from which to ascertain what vessels are to be completed within those years, and, further, in the study of treaty effect in this regard we should exclude all vessels laid down prior to the treaty. In order to gauge the effect of the treaty on relative newness of naval tonnages, it appears fair to compare the following figures to the total allowed tonnages: (1) The total tonnages that may be laid down to December 31, 1936, and, (2), the total tonnages which may be completed to December 31, 1936. As already mentioned, both methods are somewhat fallacious because they do not make allowance for the fact that the building programs undertaken before the treaty are not considered.

TABLE VIII.—PROPORTION OF ALLOWED TONNAGES WHICH MAY BE LAID DOWN TO DECEMBER 31, 1936.

	United States Per cent	Great Britain Per cent	Japan Per cent
Capital ships	None	None	None
Aircraft carriers	51.0	66.7	24.2
Cruisers:			
Over 6″ guns	27.8	None	None
6″ guns & under	60.7	92.6	53.5
Destroyers	100.0	80.3	35.0
Submarines	75.7	47.6	36.5
Total	35.3	35.9	18.2

TABLE IX.—PROPORTION OF ALLOWED TONNAGES WHICH MAY BE COMPLETED NEW CONSTRUCTION* OR REPLACEMENTS TO DECEMBER 31, 1936.

	United States Per cent	Great Britain Per cent	Japan Per cent
Capital ships	None	None	None
Aircraft carriers	51.0	66.7	24.2
Cruisers:			
Over 6″ guns	16.7	None	None
6″ guns & under	50.8	47.3	35.6
Destroyers	100.0	78.4	26.4
Submarines	47.5	35.4	22.8
Total	31.0	27.8	13.2

* New construction does not refer to age but means vessels laid down after the effective date of the treaty.

Tables VIII and IX above indicate that in 1936 or shortly thereafter the navies of

TABLE X.—BUILDING PROGRAMS 1922–1930.

United States Tonnage	Great Britain Tonnage	Japan Tonnage
138,000	204,000	243,000
100%	147.8%	176.1%

the United States and Great Britain may have about the same proportion of new vessels, while the Navy of Japan may have only about a half of this proportion.

From any viewpoint one chooses to select, it appears essential that the United States adopt and carry through a definite building program in conformity with the terms of the London treaty. This is essential for the following reasons among others:

(a) To insure to the United States a Navy of a size and composition approximating the requirements of national security, and commensurate with our position of influence and responsibility in the world.

(b) To provide a Navy which is balanced as to types of vessels, each type to be logically developed and progressively improved as a result of experience gained during the continuance of the program. This would result in better ships and would preclude having a large number of the same type becoming "over age" at about the same time.

(c) To place our government in a satisfactory position to discuss limitation of naval armament at the conference to be held in 1935. Whatever shortcomings the London treaty may have from the American viewpoint, they are largely attributable to the fact that our delegates were compelled to discuss naval armament on the *status quo* basis rather than on the basis of the Washington treaty. We should not be placed in such position again.

Graphical Piloting Methods

By FREDERICK L. MOSHER
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THE methods outlined in this article were designed as an aid in the solution of the large number of piloting problems that the professional navigator or yachtsman meets in his work.

The value of the charts described in this article were designed as an aid in lessening the labor of computation and should be of practical appeal to any navigator not equipped with a stadimeter or range-finding equipment. It will be noted that each chart contains complete direction for its use, and is, therefore, capable of application without other text.

The charts used in connection with this method were constructed on the nomographic or alignment principle and consist of a series of logarithmic scales, to an individual base, so placed in relation to one another that one value of a variable may be multiplied or divided by a value of the second variable and the result read directly from the third scale. The trigonometric formulas applicable to each chart will be found thereon. It may be preferable for the reader to omit the following paragraph, which is offered for those interested as to the details of the theory upon which the charts were constructed, until after a thorough understanding of the application of the charts to practical problems has been obtained.

1. To obtain scale of m:— $m = \dfrac{m'\,m''}{m'+m''}$

2. To obtain relation of Z to Y:—

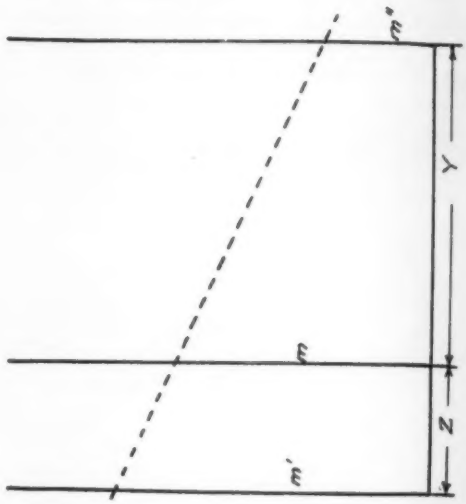
$$m' : m'' = Z : Y$$

Let n = numerical equivalent of m

Let n′ = numerical equivalent of m′

Let n″ = numerical equivalent of m″

then $n''\,m'' + \dfrac{(n'\,m' - n''\,m'')Y}{Y+Z} = nm$



assume $n' = n'' = 1$

then $n = 2$

therefore

$$\left[m'' + \frac{(m'-m'')\,Y}{Y+Z}\right]\tfrac{1}{2} = m$$

As a check,

Let $m'' = .4$, $m' = .6$, $Y = 1$, $Z = 1.5$,
$n = 10$, $n'' = 8$

$$m = \left[.4 + \frac{(.6-.4)}{2.5}\right]\tfrac{1}{2} =$$

$$\left[.4 + \frac{.2}{2.5}\right]\tfrac{1}{2} = .24$$

$$nm = 8(.4) + \frac{(.6)\ (10) - 8\ (.4)\ 1}{2.5}$$

$$= 3.2 + \frac{6-3.2}{2.5} = 4.32 \text{ nm}$$

$$n = \frac{4.32}{.24} = 18.$$

CHART A

Enter Col A with Ht. or length of object.
" " C " Sextant Angle.
A straight line intersecting the
point in Col A and Col C will
indicate in Col. B the distance
off.

HT. OR LENGTH OF OBJECT.

	COL. B DIST. OFF	$\cot q = \frac{B}{A}$ $B = \cot q \cdot A$	COL. C OBS. ANGLE
200	10000		0°00'
190			
180	9,000		
170			
160	8,000		1°20'
150			
140	6,000		1°40'
130			
120	4,000		2°00'
110			2°20'
100	3,000		
95			2°40'
90	2,000		3°00'
80			3°20'
70			3°40'
	1,000		4°00'
	900		4°20'
60	800		4°40'
	700		5°00'
	600		5°20'
	500		5°40'
50	450		6°00'
	400		6°20'
45	350		6°40'
	300		7°00'
40	250		7°20'
	200		7°40'
35			8°00'
	150		8°20'
30			8°40'
	100		9°00'
26			9°20'
			9°40'
20			10°00
15			

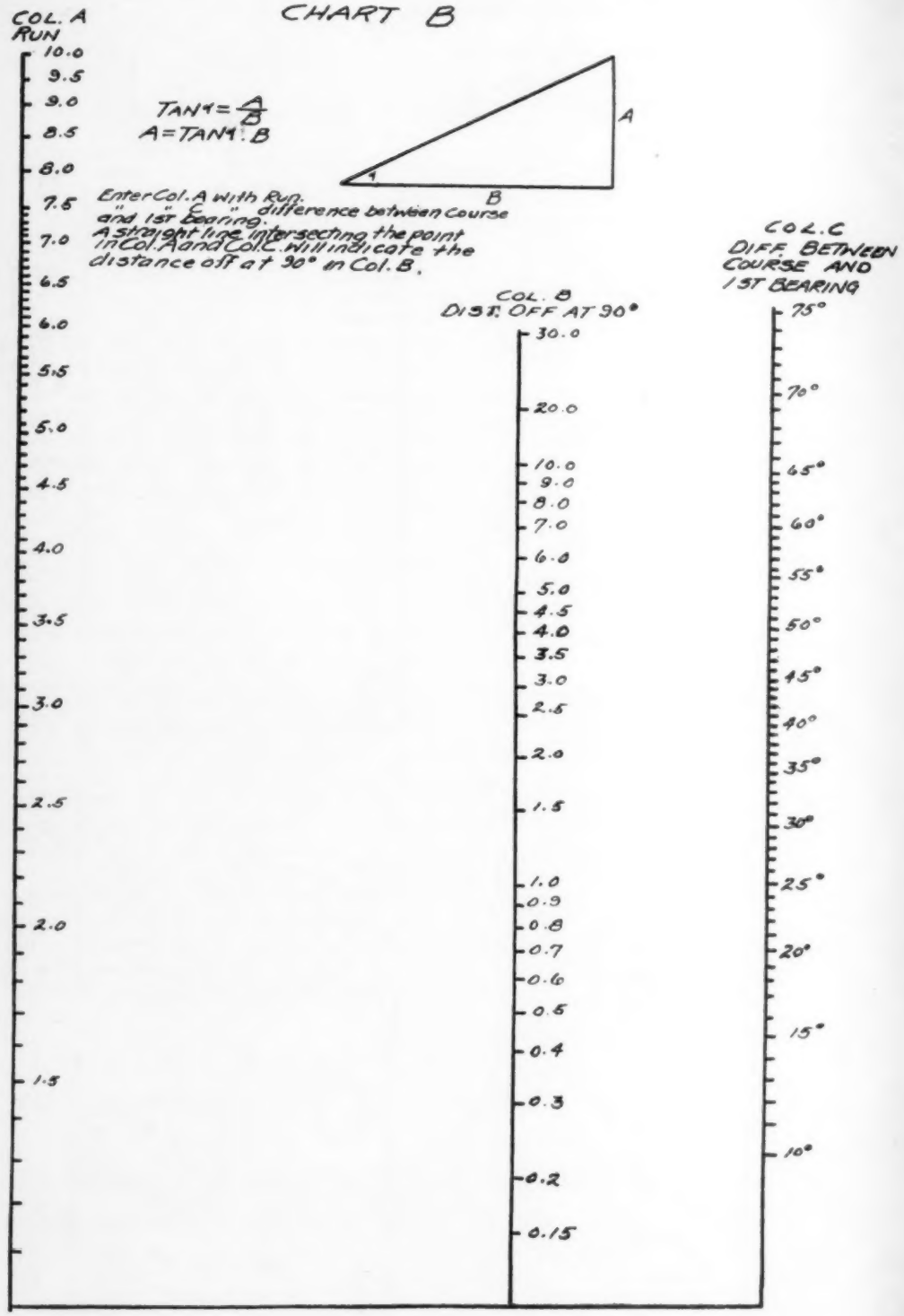
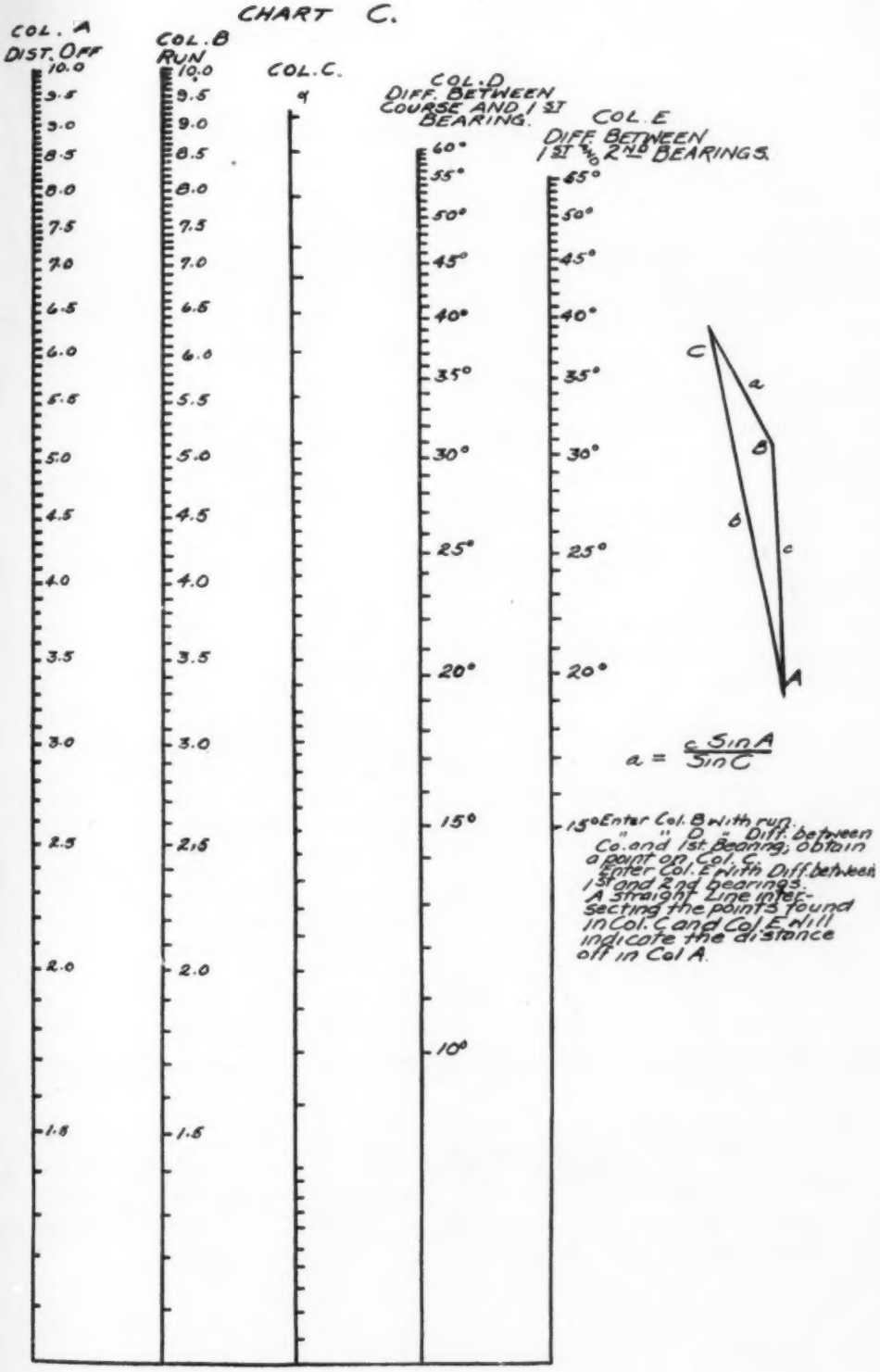


CHART B
COL. A
RUN
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
TAN 1 = A/B
A = TAN 1 · B
A
B
1
Enter Col. A with Run.
" " C " difference between course
and 1st Bearing.
A straight line intersecting the point
in Col. A and Col. C. will indicate the
distance off at 90° in Col. B.
COL. B
DIST. OFF AT 90°
30.0
20.0
10.0
9.0
8.0
7.0
6.0
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.15
COL. C
DIFF. BETWEEN
COURSE AND
1ST BEARING
75°
70°
65°
60°
55°
50°
45°
40°
35°
30°
25°
20°
15°
10°

CHART C.


COL. A
DIST. OFF
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.8
COL. B
RUN
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.8
COL. C.
q
COL. D
DIFF. BETWEEN
COURSE AND 1ST
BEARING.
60°
55°
50°
45°
40°
35°
30°
25°
20°
15°
10°
COL. E
DIFF. BETWEEN
1ST AND 2ND BEARINGS.
65°
50°
45°
40°
35°
30°
25°
20°
15°
C
a
B
b
c
A
$a = \frac{c \sin A}{\sin C}$
Enter Col. B with run.
" " D " Diff. between
Co. and 1st Bearing, obtain
a point on Col. C.
Enter Col. E with Diff. between
1st and 2nd Bearings.
A straight line inter-
secting the points found
in Col. C and Col. E will
indicate the distance
off in Col A.

The charts have been assembled for three separate types of problems:

Chart A.—To obtain the distance to an object when the sextant angle and the height or length of the object is known.

Chart B.—To obtain the distance when the object bears 90° or abeam, knowing the run and a previous bearing.

Chart C.—To obtain the distance at any time knowing one previous bearing and the run between that bearing and the bearing of the point or position desired.

The scales of any of the charts designating distance are of arbitrary value and may be read as 0.1, 1.0, or 10.0 provided the resultant is similarly applied. Scales may also be expressed in any system of units.

The application of the charts is as follows:

CHART A.

1. Enter Column A with the height or length of object observed.
2. Enter Column C with the corrected sextant angle.
3. A straight line intersecting the two points found in Column A and Column C will indicate the distance in Column B in terms of Column A.

CHART B.

1. Enter Column C with the difference between the course and the first bearing.
2. Enter Column A with the run from the first bearing until object bears abeam or 90°.
3. A straight line intersecting the two points found in Column A and Column C will indicate the distance in Column B in terms of Column A.

CHART C.

1. Enter Column D with the difference between the course and the first bearing.
2. Enter Column B with the run.
3. A straight line intersecting the two points found in Column D and Column B will indicate a point in Column C.
4. Enter Column E with the difference between the first and second bearings.
5. A straight line intersecting the points found in Column C and in Column E will indicate the distance off in Column A in terms of Column B.

Examples of the application of these charts are as follows:

Chart A.—Height of object 150 feet; corrected sextant angle 9°26′; distance 900 feet.

Chart B.—Difference between the course and first bearing 40°; run 3 miles; distance 2.5 miles.

Chart C.—Difference between the course and the first bearing 10°; run 3 miles, giving point on scale Column C; difference between the first and second bearing 20°; distance 1.5 miles.

As will be seen, the application of this group of charts makes it possible for the navigator to lay aside the time-honored methods of waiting for two- and four-point bearings, or pairs of bearings, whose natural cotangents differ by unity, and to simply obtain a fix with whatever bearings and distance run may be available.

Newspapers *and the* Navy

By LIEUTENANT (J.G.) HANSON W. BALDWIN, *U. S. Naval Reserve*

THE United States government has been described as the greatest publicity agent in the world. The Navy Department, as an integral part of the government, usually manages, insofar as Washington is concerned, to hold up its end of this vast system of collecting and releasing news to the press, but in other sections of the country the Navy's publicity scheme is either nonexistent or woefully inadequate.

Some believe that there is a syllogism in the Navy of today that since newspapers are largely anti-Navy and newspapers mold public opinion, public opinion is anti-Navy. In the opinion of the author, both the major premise and the conclusion of this syllogistic reasoning are faulty, though without doubt there is marked room for improvement in the relations between the Navy and the press and in the attitude of the public towards the Navy. But such an improvement can only come by an effort from within the service, an effort which since the war has either been wholly lacking or has been misguided in its direction.

"The country doesn't want a Navy; public opinion has deserted us." Since the war that remark or its equivalent has echoed countless times in the wardrooms of every commissioned vessel as disgusted officers reading newspaper articles or editorials find something objectionable in the accounts. But the wardroom interpretation is biased by environment. The country has not deserted the Navy; the Navy has not made itself an integral part of the country. It has not succeeded in making itself part and parcel of the national life; it has not become real in the minds of millions of Americans.

Such a failure can only be attributed to the lack of effective and sustained publicity, the lack of organization, facilities, and equipment for the gathering and dissemination of service news to the newspapers and publications of the nation. Naval advertising is woefully inadequate; in fact except for a brief effort every Navy Day and for the meager achievements of the recruiting officers, the Navy's advertising is practically nonexistent.

Such a fault in the organization and administration of the "first line of defense" is the more surprising when one considers how the Navy has kept up with the times in other respects. Every large business organization in the country either has a special department to handle its publicity and to act as liaison with the press or it retains a publicity firm to handle its relations with newspapers and other publications. Even prominent men who are often on the front pages of newspapers are accustomed to employ a "public relations counsel," a "publicity man," or "press agent" whose duties are determined by the orders of his employer, but who is always expected to "know the ropes" of the newspaper game and to be a source of information for inquiring reporters.

John D. Rockefeller, sage of Pocantico Hills, employs the best-known publicity firm in New York to act as his personal public relations counsel. Every big organization which has good-will to sell as well as material products has a publicity department or a publicity director. Branches of the New York state government employ publicity agents whose entire time is devoted to the dissemination of information to the press. Big steamship lines stress the importance of proper publicity and employ men whose business it is to keep their fingers on the pulse of the organization and to be a ready reference book for reporters. Even the *Graf Zeppelin* on its more recent flights was represented by a New York publicity firm, and a number of prominent aviators turn all public relations questions over to such firms.

It seems surprising therefore that the Navy has not followed suit; but it is surprising only in one light. Few officers who are immersed in professional affairs can

realize the importance of service advertising until they have severed their connection with such affairs and are thrown into civilian life. Then, when all about them, these officers comprehend the untutored concepts with which the average civilian views the Navy, they cannot help but feel that there is something lacking in the Navy's program. The author in his capacity, since resignation, as a reporter for Baltimore and New York newspapers, has had particular opportunity to observe the lack of knowledge of the public. Several times he has had forcibly brought to his attention the Navy's complete lack of an effective organization for publicity.

This lack of organization has not only prevented the country from gaining a proper concept of the Navy, but it has engendered misunderstandings and even bitterness between the service and the press and it has undoubtedly worked against a betterment in the type of recruits enlisted in the Navy. The average officer pictures the average reporter as a sloppy, half-drunk, hail-fellow-well-met individual who cannot be trusted and whose aim in life is to get people in trouble. The average reporter believes the average officer is a superior, unobliging, dictating sort of a person who conceals or endeavors to conceal behind an uncompromising attitude some secret of great news importance. Perhaps there is just a bit of truth in both caricatures; truth which makes the solution more difficult.

If both newspapers and the Navy could become better acquainted and could glean a truer idea of the other's functions and aims, less misunderstanding would result. It is difficult to get the other fellow's point of view unless one is broad enough to lift oneself out of the sphere in which one works, but results achieved justify the efforts.

Since my inculcation in newspaper work I have been seriously asked by naval officers if certain papers were not owned or influenced by British capital or if certain other papers were not supporters of internationalism. To a newspaper man working for an American daily such a question seriously put seems almost absurd, for the very keystone of success in American journalism is adherence to American institutions and ideals. The successful newspaper must keep in touch with the tastes of the public as well as aid in forming them; the successful newspaper must feel the pulse of public opinion accurately to continue successful. Hence such an accusation reflects not only on American newspapers but on the American public and cannot be seriously entertained. If the public—if the newspapers support disarmament conferences, advocate cuts in navies, and sponsor programs for international coöperation and steps for outlawing war, they should not be accused of anti-Americanism, even if such steps should interfere with the naval building program and the maintenance of the Navy at what some may regard at its proper level. It should be borne in mind that what in a material way may be for the good of the service, is not necessarily always for the good of the country.

At other times I have been asked why papers print such mistaken and often fallacious articles about ships or guns or things naval. The answer is because the papers don't know and the Navy has not helped them to know. No reputable paper will print any "story" unless it is sure that its information is true and that its source of information can be trusted. Hence most of the facts pertaining to the Navy in reliable journals are correct despite this lack of assistance by the Navy, but in certain "yellow" sheets and in the tabloid form of newspaper which has had a mushroom growth since the war, facts are not as carefully checked as they should be. But here again the query might be answered with another question: if the Navy objects to such misinformation (and it should) what has it done about it?

I have also been told by naval officers that they will have nothing to do with reporters because journalists are not trustworthy and their statements in the public press may get officers into serious trouble and may even interfere with their promotion. Such a fear of reporters is ungrounded and should not exist in a public organization such as the Navy. The average reporter can be implicitly trusted not to reveal a confidence. There are exceptions to such a statement but the ethics of journalism, the unwritten laws of the profession, proclaim that a confidence is a sacred trust and cannot be used as news except with the permission of the source. But few reporters will violate this rule.

"Yellow" journalism, which has in many cities so sadly debauched the modern newspaper, is, it is true, often unreliable and its henchmen cannot always be trusted. But the naval officer, widely read and widely traveled, should without difficulty be able to distinguish between the reliable newspaper and the bawdy scandal sheet, and should govern his actions towards the various employees accordingly. A reliable paper will not only hold confidences as confidences but will also be careful to print nothing but the truth, without bias or slant. With such assurances and fortified with the common sense of the naval profession, what danger can there be in welcoming the gentlemen of the press?

It is unfortunate but true that despite the value of mutual contact between journalists and naval officers, the Navy (not as a recognized departmental policy but more as an attitude of the officers and a sin of omission) seems to discourage such contact.

"Why is it?", I have been asked by fellow reporters, "that naval officers are so difficult to deal with?"

"Well, I didn't know they were," I have answered, "until reporters told me so."

But at times in my contact with the Navy, despite the fact that I am still a reserve officer, I am ashamed to say that I have found truth in the objections.

On one or two occasions when I was "covering" naval assignments I have been met with a brusqueness and a condescension that should be as intolerable in the Navy as it is in civilian life. I have seen other reporters, reporters who did not know the ropes of things naval as well as I, treated not only with positive discourtesy but greeted with manner and language so insulting that it was sure to leave its mark on that reporter's impression of the Navy.

On one occasion when I was aboard a destroyer in the Hudson River, a small boat with a reporter and photographer aboard attempted to come alongside while the reporter sought permission to board the ship. Before the boat could even come near the gangway, the reporter was greeted with a string of curses from the bridge and ordered to "get the hell out of there." In military or naval life, the subordinate often has to take such a greeting and "like it;" in civilian life there is always a "come-back" and hence reporters who have received such treatment cannot be much blamed for "panning" the Navy. The majority of the reporters who covered a recent accident and the Navy's rush efforts to save lives were unanimous in condemning the lack of press arrangements and the discourtesy with which the press was treated. On the other hand, press representatives who covered the last fleet review by the president were loud in their praise of the treatment accorded the press. In the first case there had been no arrangements for the press until the damage was done; in the second, all press arrangements were made by officers attached to the Navy Department. The difference was amazing.

The naval officer often mistakes the type of man with whom he must deal when he attempts to judge a reporter. The average type of reporter for the respectable newspaper is a far higher class figure than the naval officer believes. Many of the reporters of today are college graduates; some of them have been business men or professors; some have been lawyers, a few have been in the foreign service, and all of them are well educated by the school of experience and in the majority of cases know more of the world of events than the average naval officer. The reporter for the higher type of paper hopes to be treated like a gentleman and has a right to expect it. If he is so treated you will not only win his friendship but he will react as a gentleman should. There is no mystery about the press or its followers; the reporter and the naval officer would be brothers under the skin if they could only be made to understand the sameness of human nature.

But to promote such understanding, to foster such a spirit of coöperation, to put the Navy before the public in the right light, there is no organization worthy of the name. The Navy objects to unfavorable publicity but confines its objections to denials after the damage is done. From Washington the Navy Department sends out reams of "canned copy" to newspapers all over the country but little of appropriate local significance goes to the individual newspapers of the various cities. Once a year the Navy makes a spasmodic effort and spends lavishly of time and money in sending ships to various ports for Navy Day. For twenty-four hours the public hears about the Navy, for twenty-four hours the public treats the Navy as a

curiosity and then proceeds to forget it. The only effective publicity is sustained publicity, year-round publicity, publicity not only in Washington but throughout the nation. Navy Day is fittingly observed, but what about the other 364 days in the year? The money spent on Navy Day if properly used for publicity purposes throughout the year would probably be much more effective than a yearly spasmodic effort.

On every Army post in the country, attached to the staff of every corps area are officers whose duty is that of getting the Army into print—publicity officers. Not a single Navy ship has an officer assigned to publicity purposes for that ship; not a single naval district has an officer assigned to publicity purposes for other than recruiting or some specialized service. In other words, outside of Washington, there is no *sustained* effort to put the Navy before the people. In New York every newspaper office knows whom to call when information is desired about the Army. But when naval information is desired, for the reporter who does not know the ropes the task is often a hopeless one. There is no one person to whom he can turn for information; there is no one source of naval news in the city, no "publicity man" for the third naval district. On one well-remembered naval assignment I was shuttlecocked from the duty officer to the commandant and finally gleaned my information only after calling up the admiral himself. In marked contrast to such a lack of organization is the Army system.

The Army publicity is an integral part of Army regulations. Their regulations require each post commander to appoint a publicity officer. This officer is generally a staff officer, who ordinarily handles press relations in conjunction with intelligence duties, but in some cases the publicity officer has publicity as his sole function. Thus in New York, the Army information service, a unique organization, is headed by an Army captain, who gives all his time to this work. Every post and corps area has publicity officers, who work in general under the direction of the Office of Military Intelligence in Washington. This year the School of Journalism at Columbia University numbers among its students two Army officers.

Daily in New York City, the Army information service "feeds" to newspaper offices and others interested pertinent news about the Army and Army people. Anniversaries of Indian battles, old Army top sergeants who are about to retire after years of service, mascots of Army units—"human interest stuff" as well as "straight" news of timely events is given out to the papers daily in the form of printed press releases all ready for the rewrite man. When an Army unit makes an overnight hike, when Army planes fly from city to city, the Army publicity man is on the job with his typewriter and long before the unit is due to start, the papers know all about it. On the contrary when the Army has something that is secret and which for the country's good should not be printed in the public press, the publicity officer may take into his confidence any "nosey" reporters who have discovered part of the secret and ask them to treat it as a confidence. The game is played both ways and usually the coöperation between press and Army is excellent, with the result that most reporters have a good word to say for the Army whereas there are very few who will praise the Navy's relations with the press.

The Army system, with slight variations, could well be adapted by the Navy, to the tremendous advantage of the service, it seems to the author. The Navy's fundamental mistake in publicity work lies in its attempt to "sell" the Navy to the country from a centralized bureau in Washington. It cannot be done with success. It has been tried, and from the viewpoint of the newspapers, as well, I think, as from the viewpoint of the Navy, it has been found wanting. Individual publicity for individual stations, ships, and units is essential and that publicity must be locally controlled and not run by an, at best, inefficient system of remote control.

To accomplish such a metamorphosis a change in organization is necessary and an allocation of funds for such work. At present there is absolutely no organization for publicity work in any naval district in the country except in New York, unless a particular commandant has publicity as a "hobby" (and few, if any, naval officers do) and happens to assign an officer to this duty during his tour of command. No ship has an officer detailed for publicity duty and there is no provision in the *Navy Regulations* or in general orders providing for the definite handling of publicity. In Washing-

ton the "public information and press relations" section of the Office of Naval Intelligence handles its job as well as possible but it faces an almost impossible task of remote control. In New York there exists as an integral part, a field office of the Bureau of Navigation, a recruiting publicity bureau, the efforts of which are confined to obtaining publicity in order to stimulate enlistments. This office, even in its restricted status, has done noble work, but its usefulness could be tremendously expanded and its effectiveness immeasurably increased. A naval organization for publicity then is practically nonexistent, and this despite the fact that such an organization would add but little to the total budget—the funds necessary for extra clerical help and typewriters and equipment.

Thus it can be seen that the Navy Department has not provided an organization as the Army has done, whose only mission is publicity. Every naval officer will grouch about the public's attitude toward the Navy, every naval officer desires a better type of recruit, but every naval officer should realize that unfavorable conditions are the fault of the Navy's own organization or rather lack of organization. In a speech last January to the postgraduate school at the Naval Academy, Captain A. W. Johnson, then head of the Office of Naval Intelligence, said: "It is obviously the function of the Office of Naval Intelligence to safeguard the public against pernicious propaganda against the Navy." How better combat such propaganda than with truth, truth told often and well? Captain Johnson continued:

> Experience has shown that satisfactory results in carrying out our "publicity policy" (Is there one?) can only be obtained by the widest possible decentralization of information activities. This is well expressed by the following quotation from a letter addressed by the Secretary of the Navy to the naval service dated February 3, 1923:
>
> "The press of this country," the letter read, "is the most important vehicle by which information can be disseminated. It is interested in placing before its readers through news columns and editorial comment the condition of the Navy and the operation of its ships. It is, therefore, of importance to the country and to the Navy that the press should be placed in possession of all facts in connection with the service, except such as are military secrets.
>
> "It is directed that all commandants of naval districts, navy yards, and naval stations and flag officers, recruiting officers, and officers on detached duty take steps to establish and maintain cordial relationships with the press in their localities and to keep in mind the Department's policy and guide themselves accordingly."

And there the matter seems to have ended, except for the Office of Naval Intelligence and the recruiting officers who have been striving in their restricted ways to keep the Navy before the public.

The solution definitely lies in change, with, as Captain Johnson pointed out, a decentralization of information activities. The office in Washington, either the present "public information and press relations" section of the Office of Naval Intelligence in a much expanded status, or a separate Office of Naval Publicity should continue, but should act as the coördinator and general director of individual activities, and not attempt to act as the sole distributor of nation-wide publicity for the Navy.

The remedy to be complete must be definite. There must be not only a change in organization but there must be positive provision to be incorporated in the *Navy Regulations* or in a general order from the Secretary of the Navy, recognizing the need of service publicity and creating and defining the duties of a publicity officer for every ship and station in the Navy. A mere administrative change, transferring the responsibility for much of the Navy's publicity from Washington to local shoulders, will not be enough however to accomplish the end desired—sustained, effective, and desirable publicity. The Navy Department must, of course, continue to handle general publicity by mail releases and must try in every possible way to facilitate the work of the local publicity officers. It must also act as the central authority, the coördinator and administrator of all district work.

Above all it must define and emphasize the importance of the duties of the various publicity officers and it must hold them responsible for effective publicity in their spheres. The Navy Department too must, by means of reiterated general orders and the definite stating of its change of policy, reassure the officers so that they will not be afraid to take the responsibility of advertising the Navy upon their own shoulders. The officer personnel must be made to feel that there is no danger of their "getting hung" if they open their mouths to reporters. In other words, the "muzzling" of naval offi-

cers, even if it be but a moral restraint, must be done away with.

To insure the success of the scheme and to keep the various ship and shore publicity officers on their toes, it might be well to require monthly or bimonthly reports, detailing the amount and type of publicity the reporting officer has secured for his ship or station or for the Navy in general during the period, and other factual records.

The success of the entire system, however, would hinge on the seriousness with which the individual publicity officers might take their jobs and the effort which they might expend. In the naval district effective publicity would require a full-time man with clerical assistants and a well-organized system. The district publicity officer should make himself acquainted with the city editors or managing editors of the more important papers in his district and with the reporters who specialize in naval affairs. His name and telephone number should be available in every newspaper office and he should be within the reach of the press at any reasonable hour. In his absence the duty officer should be instructed to supply what information the press may require or should be told where he can reach the publicity officer in case of doubt. Just before anniversaries famous in naval history and tradition, the publicity officer should send out to the press short "anniversary sketches" telling of the event or events which make the date a famous one. He should be "on his toes" for all "human interest stuff," realizing if he is a good publicity officer that the press "eats it up." Whenever naval vessels come into port he should send to all papers the number and types of ships, together with a brief description of the vessels and of their history, the purpose of their visit, events arranged during their stay, etc. This is a big job, but the publicity officer will be rewarded, if he does his work conscientiously, by the knowledge that he has effectively brought the Navy before the people.

The task of the publicity officer afloat will be a somewhat different one. He should make himself thoroughly acquainted with the detailed history and traditions of his vessel and should be a mine of information for all inquiring reporters. He should have an alert mind and a "nose for news" so that events of the cruise will stand out in his memory and be ready for gleaning by welcoming reporters. He should be thoroughly in touch with the life of his ship and should have at his finger tips information about odd characters in the crew, mascots, etc. When his ship visits any port other than her home one, he should have mailed in advance of the prospective visit announcements of the visit to the local newspapers telling the length of the ship's stay, the visiting hours, the description of the ship and its history, and any other pertinent facts. After arrival and at frequent intervals during the ship's stay in port he should send releases of various natures to the local papers and should follow up such releases with others until the ship's departure.

In furtherance of the individual scheme there should, of course, be fleet and unit publicity officers, whose duties would be to coördinate and supervise the efforts of the individual publicity officers and to aid in general publicization. Aircraft squadrons should have regularly assigned publicity officers, who should take every advantage of the growing air-mindedness of America to push home the duties, composition, and abilities of the "flying fleet."

In general the majority of such publicity work would be in connection with the daily newspapers of the country as the best medium to reach the local and national consciousness and as the best form of sustained advertising. But other important sources of publicity should not be ignored—magazines and other publications, and motion and still pictures. These fields could be cared for to some extent by local publicity officers but Washington should be of tremendous aid in such matters. A more thorough coverage pictorially of the fleet in action could be obtained and released to the American public annually with such an organization. The magazine publicity would rest to a great extent with the officers of the Navy themselves. Magazines and publishers "eat up" interesting, timely articles about the Navy from naval officers, and it is unfortunate that so few of them put pen to paper to record for America the needs, doings, thoughts, and hopes of the service.

Such is the composite picture of a desirable publicity organization as seen by the author. If it is true, as has been said, that "publicity won the war," is it not worth while to continue in peace time the functions of a proved servant?

Freak Warships—Their Influence *on* Naval History

By FLETCHER PRATT

"THESE admirals of mine," said Napoleon in a moment of not unjustifiable irritation over the rat-chased-by-a-cat strategy of Linois and Missiessy, "These admirals of mine have discovered something new. They have found out that war can be made without running risks."

This discovery is one of the hardy perennials of naval warfare. Among the French admirals it took the unusual form of a new brand of strategy; but it more often appears as a new and fearful warship, which shall sweep the navies of the world into the scrap heap at a blow. Needless to say, it is generally a landsman who makes the discovery.

Most of these great ideas have died in the paper stage (if you believe the inventors, because of the machinations of rivals) but every so often one gets itself worked up into an actual, visible warship, another of those astonishing monstrosities which, perhaps more than anything else, demonstrate the vagaries of which the human intelligence is capable.

Right at the beginning, it is worth while admitting that freak warships sometimes succeed. The *Monitor* was a freak; *Holland No. 9* was a freak; so was the *Dreadnaught* and (to go back) the *Constant Warwick*, first of frigates. The answer is that in this study, necessarily brief, we shall draw a wholly invidious distinction between freak ships that have succeeded and those that have failed, and confine our attention to the latter. The successes have left obvious marks on naval construction of today; it is only when we say that the failures also have interest and importance that we get into a region where proof is required.

Ptolemy Philopator of Egypt, with one of the finest navies of the ancient world, built the first freak—or rather his ministers built it, since he was too fond of the wine cup and the harem to give serious attention to anything else. A naval architect named Pyrgoteles seems to have been behind it. The ordinary battleship of the age was the *quinquireme*, with five banks of oars. Demetrius, the Besieger, had built an eleven-bank monster (which was duly captured in its first engagement) and in Rhodes and Phoenicia ships nearly as large had been produced.

Pyrgoteles' idea was to outdo all other navies at one fell swoop by constructing a ship with thirty banks of oars, one above the other, which should be immune to attack from her very size, and should crush all opposition by her very weight. His ship was, we are told, 480 feet in length, had a beam of 57 feet, and towered 72 feet up from the water's edge. It took 4,000 rowers to move the vessel, those in the upper banks handling counterbalanced oars nearly 90 feet in length.

Like other ships in ancient times, she was built on land. Now it was a job to get the ordinary *quinquireme* to water, even with unlimited slave labor, and for this giant it appeared a flat impossibility. By an exercise of ingenuity worthy of admiration even in this mechanical age, an unnamed Phoenician accomplished it. He dug under the huge ship a trench, making a small section at a time, and carrying the weight of the ship on crossbeams supported by piles. As the trench became deep enough the piles were replaced with stone pillars. The end of the trench was provided with a lock gate; when it was complete a channel was dug to the ocean and the big ship warped out. Naturally, she could not be hauled up on shore at the end of a cruise, like other ancient war vessels, so she was brought back to the place of her construction, floated in, the lock gate closed and the water pumped

out—thus leaving her in the first dry dock on record. (Which is invention number one to be laid to the freak ship.)

The vessel never accomplished anything in warfare and came to so inglorious an end that it is not even recorded; probably turned over to the Syrians with the rest of the Egyptian Navy at the peace which followed the wreck of Egypt's fortunes in the disastrous battle of Panium. She may have been broken up, as they had no place to keep her.

The dimensions of this vessel sound so incredible that up to a few years ago it used to be a common sport to speculate on what error in facts or figures could have occurred to bring them out in that form, but a statue of Pyrgoteles was recently dug up, with an inscription confirming the figures of the ancient authors. This should make it final; the ancients would hardly lie about the size of a ship in a votive inscription to their gods; and Pyrgoteles must have done something extraordinary to have his statue set up.

The dream of every naval inventor is to win a war, or at least a battle, by means of his invention. In all the world's naval history only one man fully accomplished it (though John Ericsson came near). That one man was Caius Duilius, and he did it because the Romans had the courage to use a new invention in the only way in which such an innovation can really succeed—by going the whole hog and building not one queer ship, but an entire fleet. It took nerve for the non-seafaring Romans to attack Carthage, the first naval power of the world, on the water at all; it took more to trust the fortune of their fleet to a wholly untried contrivance. This invention was the *corvus*, a combination boarding bridge and grapnel, worked from the bows of the new Roman ships. It operated like the boom of a derrick from a heavy mast, the end of the *corvus* being furnished with a huge barbed, spear-pointed weight which would carry right through the deck of a hostile ship and hold it firmly.

Duilius gallantly took his odd fleet into action with the whole Carthaginian Navy at Mylae; the derricks dropped, the grapnels held, the invincible Roman legionaries boarded the Carthaginian ships and swept them from bow to stern like a flood of fire. The result was the ruin at one stroke of the Carthaginian sea power, a blow from which the great commercial city never quite recovered, though later on they discovered that the way to discount the *corvus* was to meet the Romans in a seaway. But rough weather was not always available, and the Romans by this time had learned how to handle warships themselves.

The *corvus* was soon abandoned as making ships too top-heavy; moreover after the first time they lost a fleet in a storm the Romans no longer trusted their crack troops on shipboard and were not much more anxious to board than their enemies. Duilius had amazing luck in not running into a storm before he met the Carthaginians. But he and Rome deserved to win; consider what the effect would have been had the Confederates appeared with not one, but a fleet of *Merrimacs* in 1862; or if Germany had put all her shipyards to work on U-boats in 1914, or—well, why speculate? The lesson is that if one freak warship is a failure a fleet of them is quite apt to be a success. The single freak gives the enemy time to study out a defense; the fleet gives the advantage of surprise to go with the freak's peculiar method of offense, whatever it may be.

From the First Punic War to the American Revolution is a long jump; but the intervening years offer hardly anything that can be called a freak warship. Inventiveness found no outlet in Roman times, since there was only one sea power left in the world after the fall of Carthage; and the modern world opened with inventors occupying themselves with the problem of a ship that would stay afloat. But by 1775 development had reached a point where something new could be produced.

The something new was the work of an American. It was called the *Turtle*, a submarine, and operated around New York in 1776; David Bushnell, the inventor's name. Nothing practical came of it—twice Bushnell's well-laid plans to blow a British warship into the middle of next week were foiled by the ship's copper sheathing. Bushnell had the right idea however; his boat embodied principles not rediscovered until the days of Holland and Lake. His boat maintained an equilibrium in an awash position; was propelled by a screw; had a conning tower that was a crude kind of periscope; had ballast tanks and even diving

planes—a truly marvelous anticipation of the future in all these lines. All Bushnell lacked was the automobile torpedo, but this lack was fatal, and even the memory of his craft was forgotten until later submarines demonstrated how right he had been.

Over in France, about the same time, an engineer named D'Arcon had an idea for an invulnerable ship. He took his plan to the Spanish court, got it approved, and was commissioned to build ten of them to batter in the defenses of Gibraltar, to which the French and Spanish were about to lay siege. The result seems a violation of the statement that a fleet of freak ships is a success.

The ships were built around the hulls of old frigates and line-of-battle ships. Designed to be invulnerable to the shot of the fort, their sides were made six or seven feet thick, of green timber, with old cordage mixed in, the whole mass being bolted tight and plated with cork and rawhide (Why not iron? one would think). The upper decks had heavy mantlets of the same construction hinged to the bulwarks and intended to be propped up in action to skid off the shot of a plunging fire. The inside of the gun decks were covered with layers of wet sand, and here and there in the seven-foot sides were reservoirs of water which, when burst by shot, would extinguish any conflagration at its source. The guns were few in number (the two largest ships, both two-deckers, were pierced for only twenty-one on a side) and of the heaviest caliber available, probably 68-pounders. The ports were lined with tin as protection against the flash. All were rigged with masts and sails.

The idea (apart from the singular omission of iron) was not bad, but the Spaniards built these "battering ships" at Algeciras, just across the bay from and in full view of Gibraltar, whose defenders could watch every step and discount it as soon as taken. Sir George Elliott of course strengthened his water batteries to a point where they would stand any amount of hammering, and realizing he had no guns powerful enough to get through the sides of these monsters, had furnaces placed in every battery to heat the cannon balls red hot with the idea of setting the enemy on fire.

On September 13, 1782, the besiegers, after having sent Elliott (in the good old eighteenth century way) some fowl and a basket of fruit with the warning that they were about to blow him to bits, moved out to attack fortifications that had been ready for them for months. The battering ships stood it for several hours, and won some success. The defenders grew anxious as one merlon was actually beaten in and some seventy men were killed. Then one of the ships began to show signs of distress. Her reservoirs were exhausted and the Spaniards were unable to tow her out for repairs. About seven in the evening two of the battering ships began to belch smoke. At midnight one of the ships burst into brilliant flame, illuminating the whole scene. The forts woke up again, firing nothing but hot shot at the now helpless battering ships. Between three and four in the morning six more of the ships caught fire, and another blew up with an explosion so frightful that it wrecked an English gunboat two cables' lengths away. At dawn the two survivors of the first armored fleet the world had seen surrendered and were burned by their captors.

The *Turtle* was based on the idea of invulnerability through invisibility; D'Arcon's ships on that of invulnerability through impregnability. A third ideal—that of invulnerability through maneuver—governs a whole race of vessels built by the Swedes in the last quarter of the century. Sweden was engaged in its endemic conflict with Russia, and the Baltic was the scene of considerable naval movements. Now the Baltic is filled with small islands, rocky skerries and dangerous shoals, a good many of them then uncharted. The winds are either light and baffling or wild gales that soon have a ship on a lee shore. To meet these conditions, Chief Naval Constructor H. af Chapman designed ships of shallow draft (to get over the shoals) propelled by both sails and oars (to sneak up on a becalmed Russian and shoot her to pieces). There were four types of these vessels, called respectively *hemmemas, turumas, udemas, and pojamas.*

They were all polacre-rigged but only the *hemmemas* carried topgallant sails. The first three classes were about the size of small corvettes, a typical *hemmema* being 146 feet long, having a beam of 36 feet and a 10-foot draft, and mounting twenty-eight guns. This class had twenty oars on a side, working in pairs between the guns. The *turumas* and *udemas* had the same number

of oars, worked from crutches in the wings of an upper deck, the rowers being outboard from and above the guns. The wings were fitted with heavy hinges and hoisted out of the way when under sail.

The two smallest classes (*udema* and *pojama*) shared a remarkable method of mounting their guns. Both sides were pierced with gun ports, but the guns were only half the number of the ports. They were mounted on slides held in position by heavy cleats on the deck. When it was desired to reverse (or otherwise alter the position of) a gun, it was jacked up with marlinspikes, swung round on a pivot set in the center of the slide, and lowered between the correct pair of cleats. (The guns, of course, had regular traverses for aiming.) Now this arrangement is recognizable, with alterations, as that in the turret of the original *Monitor,* and John Ericsson was a Swede! So that here also is a development due the freak ship.

In the *pojamas,* which were small gunboats, there were only four guns, mounted in pairs *en echelon* on forecastle and quarter-deck.

The ships did not fulfill Constructor af Chapman's rosy visions. They demanded an enormous investment in crews; their shallow draft made them bad sailers, as they could not carry much canvas, and it proved impossible to row them against even a light breeze. They were useful as mobile batteries, however, and in the Russian attacks on harbors, particularly at Svensksund, they formed the backbone of the defense. And at sea a *hemmema* and a *turuma* once caught a big Russian ship in a flat calm and pounded her into surrender. The *udemas,* lacking sufficient freeboard, proved quite useless.

The fashion of naval invention having thus been set, one would have expected the Napoleonic wars to produce a whole new side show of freaks. Instead, there is not one; unless one counts the Danish gunboats, which were hardly a radical departure. (*En passant,* it is worth remarking that these too showed the influence of the Swedish types we have been discussing.) The reason seems to be that there are only two types of nation that can afford to waste money on naval monstrosities—rich, powerful, and secure governments, with unlimited funds, and naval underdogs, for whom no experiment can be a worse failure than maintaining a hopelessly outnumbered fleet. During the Napoleonic wars the sea powers (save Denmark) were so near a state of equilibrium that none of them came within the operation of this "Law of Freak Warships."

But the United States in 1812 occupied a position in the second class; and another freak was the due result. She differed from all freaks before and since in being the perfect product of the Edison of his day—Robert Fulton. Like Bushnell, he had a go at inventing a submarine; unlike Bushnell he abandoned the idea as impractical when he realized that the submarine lacked a sure method of offense. So he persuaded Congress to let him build the *Demologos,* not more than a decade after he had invented the steamship.

With astonishing prescience, Fulton produced in this ship an armored vessel (fifty years before armor), an all-big-gun ship (a century ahead of time); a sailless steam ship (fifty years in advance); complete protection for the motive power (seventy years beyond his time); and even a crude approximation of the torpedo in his "submarine gun" which was to fire heavy shot into the enemy below the water line. Only the sheer bad luck of a peace before *Fulton the First* (as she was later known) could get out of dock, made her instead of such a stunning success as the *corvus,* a complete failure, doomed to rot away at her dock and perish in an accidental explosion before her qualities could be demonstrated. But then, it might also be considered bad luck that Bushnell did not have a Whitehead torpedo.

With the explosion on *Fulton the First* perished the last trace of the freak warship for half a century. Her next appearance is again in America, now established as the land of invention, and engaged in the death grapple of the Civil War. There were not enough ships to enforce Lincoln's blockade, and the government was buying anything that would float. All the aspiring inventor had to do was get somebody to build his idea of the perfect warship; she was instantly loaded with officers and men of the U.S. Navy and sent forth to the empirical test of action. Naturally there were some fearful and wonderful freaks; that floating coffin, the Confederate *David;* the Stevens ironclads; the ninety-day gunboats (which

would "float on a heavy dew" quoth Admiral Porter); the *Dunderberg,* with a quarter of her length given over to a titanic ram; the *Wampanoag,* nearly all engines, which ground out the astonishing speed of twenty-three knots when fifteen was considered lightning fast. But behind every one of these ephemera there was some genuine germ of an idea which flowered into later warship construction. It was only when the naval lessons of the Civil War began to be learned (and misapplied) in Europe that the true freaks, without visible issue began to develop. And when they did!

The first one came from Italy. Something more powerful than gunfire seemed to be called for in view of the failure of the most powerful guns to get through the new armor. The ram was apparently the answer. Why not, then, build a ram on the lines of the *Monitor,* giving the enemy nothing to shoot at but a well-armored deck, and tearing into him to rip his vitals open below the water line? But this idea (which turns up again, as we shall see) was too much for the Italian admiralty in its purity. The ram might not be able to catch the enemy. Hence she was given two heavy guns in a turret. Result—the *Affondatore,* which was regarded with a respect almost superstitious in the Italian fleet. Admiral Persano did not feel quite safe at Lissa until he had gone aboard her; he imagined her a match for the whole Austrian fleet.

The battle justified both the schools that had joined in her design. The turret enthusiasts were perfectly correct when they said the ram could not catch the enemy, and the ram advocates when they said the shot from the guns would not penetrate the enemy's sides. The *Affondatore* accomplished exactly nothing.

A little thing like this does not quell your true theorist, and there were plenty to claim that the trouble with the *Affondatore* was her commander. A few years later the British were turning out almost a duplicate of her in the *Polyphemus,* with the difference that the turret was replaced by torpedo tubes. There was a real idea here; the *Polyphemus* was almost a submarine, running awash, and intended to use her invulnerability to get into torpedo range. But she never received the test of battle save in the novels of H. G. Wells, and before the experience gained from her could be built into another ship, the invention of the true submarine made a boat that ran merely awash seem silly.

But the ram enthusiasts had one more shot left in their locker. The *Katahdin* was built for the American Navy—the only vessel I ever heard of that was built for any Navy and refused by the government. Eventually she was taken off the builders' hands at junk rates (very appropriately) and for a time lumbered around at a rattling eleven knots, while the *Iowa* and *Indiana,* vessels of the class she was supposed to run down, breezed by at fifteen.

So much for the rams. Now let us turn back for a moment and note the result produced by a logical habit of mind and the Slavic temperament. Somebody told Admiral Popoff of the Russian Navy that the trouble with monitors was that they could not turn quickly enough to avoid a ram, and that their turret mechanism frequently jammed. Why not turn the ship instead of the turret, he inquired, and set to work on ships that would do it.

He got two of them built in the Black Sea and then died, perhaps fortunately. Their hulls were perfectly circular, turtlebacked from edges to center, on which was mounted a single turret. At either side of the turret rose a funnel; to keep from blanketing the fire of the guns, the ship, turret and all, was to be turned by the use of the engines, and for this purpose, the vessels had six screws, stuck all round the hull, like cloves in a cake. Both above and below the water line they were armored. The *Vice Admiral Popoffs* (one of them was named after the inventor) would do seven knots in a calm sea provided there were no head wind. During the war with Turkey, which came along four years after their construction, they were moored in Odessa harbor, out of harm's way.

In 1888 the effective range of the torpedo was short. Why not arrange a way to deliver that trainload of dynamite through the unresisting air instead of the water? True, a vessel's upper works are less vulnerable than the portion below the water, but a powerful explosion has a destructive effect, no matter where it takes place. This was the reasoning behind the *Vesuvius,* built in that year for the American Navy, with three compressed air guns running through her

decks, and to be aimed, like those of the *Admiral Popoffs,* by pointing the ship. As with the other American freaks (save only the *Katahdin*) the idea was all right; the only trouble was that the development of high explosive shell made such cumbersome arrangements unnecessary.

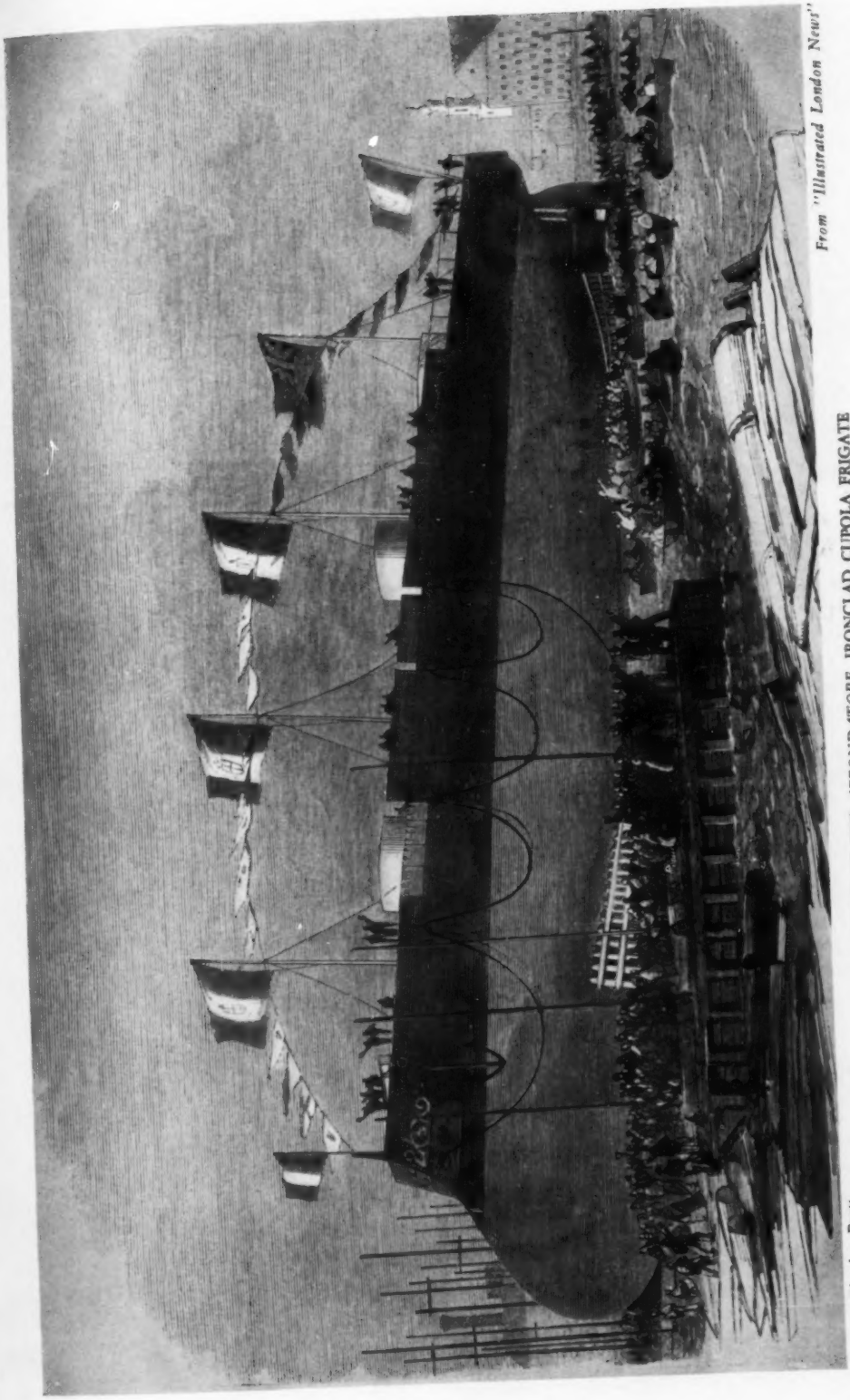
Naval development also outmoded the French *Chateaurenault* before she had a chance at action. She deserves some sort of distinction as the only freak cruiser; all the rest are invulnerable, invincible, or invisible battleships. A great deal of money was spent in giving her the lines of a liner, a liner's swept-in stern, and a superstructure of pseudo-cabins amidships. Her battery of 6-inch guns was mounted to be as nearly invisible as possible, and she was given a speed sufficient to run down liners. The *Chateaurenault* was, in fact, a supercommerce destroyer, built to lure unsuspecting enemies under her guns before they realized what she was. But only a couple of years after she was commissioned, the system of identifying the world's ships by their silhouettes was invented, and she became just another cruiser, and all the elaborate camouflage preparations were not worth a cent. The commander of the German submarine who slapped a torpedo under her ribs had not the slightest doubt of her true character.

The European war, like the Napoleonic, produced little in the way of *outré* invention, though toward the end as the scales tilted heavily against Germany she reached that stage of naval inferiority which is one of the two basic conditions for the production of freak ships. The *Moewe* and *Wolf* were certainly freaks in a world of 30-knot cruisers and giant submarines; and there were also the electric motor boats, crewless and directed by aërial observation, with which repeated attempts were made to blow up the ships of Admiral Bacon's Belgian coast blockade. Four times they were tried; twice the motor boat was sunk—once by a marvelous shot from the 9.2-inch gun of a small monitor, and once by a destroyer which easily dodged the onrushing craft and sank it with machine-gun fire. Once it failed because of mechanical trouble and only once scored a hit. Unfortunately for the Germans the hit was on the *Erebus,* a big monitor, well protected by her bulge. The *Erebus* lost two men and went to dock for a while. That was all.

If there is anything to be learned from this gallery of oddities, it is this—that freak warships, instead of decreasing the risks of naval war, place so heavy a burden on officers and crew that they often have no time for fighting. Even the successful ones are not exempt—look at the struggles their crews had with *Monitor* and *Merrimac.* The freak—in the sense not of the new naval invention, but of the *outré* and singular invention—often teaches valuable lessons, but a perfectly comprehensible partisanship so blinds those who should benefit most from these lessons (that is, the crew of the vessel and the nation that built her) that it is more often their rivals than themselves who benefit by them. For example—when Egypt recovered her equipoise after the defeat at Panium she went to building big galleys again. It was the Greeks who put the newly discovered dry dock to use.

Outside these observations lie the cases in which whole squadrons of freak ships have been built. Most of these cases are beyond the scope of this study, for the success of such squadrons has made the ships that composed them factors in the main current of naval development. I might instance the French ironclad batteries that bombarded Kinburn with such success; the first torpedo-boat destroyers; and the superposed turrets of some early battleships. Three of the out-and-out freaks we have been considering were built on the squadron plan. The Roman *corvus* ships were a huge success; the Swedish row-and-sail vessels achieved a moderate amount of success, and only D'Arcon's battering ships were a complete failure. But even here the failure was strategical; had they been sprung on the English as a complete surprise there is little reason to doubt that they, too, would have succeeded.

But the case seems unlikely to come up again. No freak (as the *Dreadnaught, Monitor* and *Holland No. 9* demonstrated) can exist very long in the modern world without being copied, discussed, and given a thorough trial by all the maritime nations of the world. The very success of these examples may be said to have killed the possibility of freak ships in the future by making it necessary for the world's admiralties to keep in touch with every new development. But still who can forecast with accuracy what the future will bring forth.

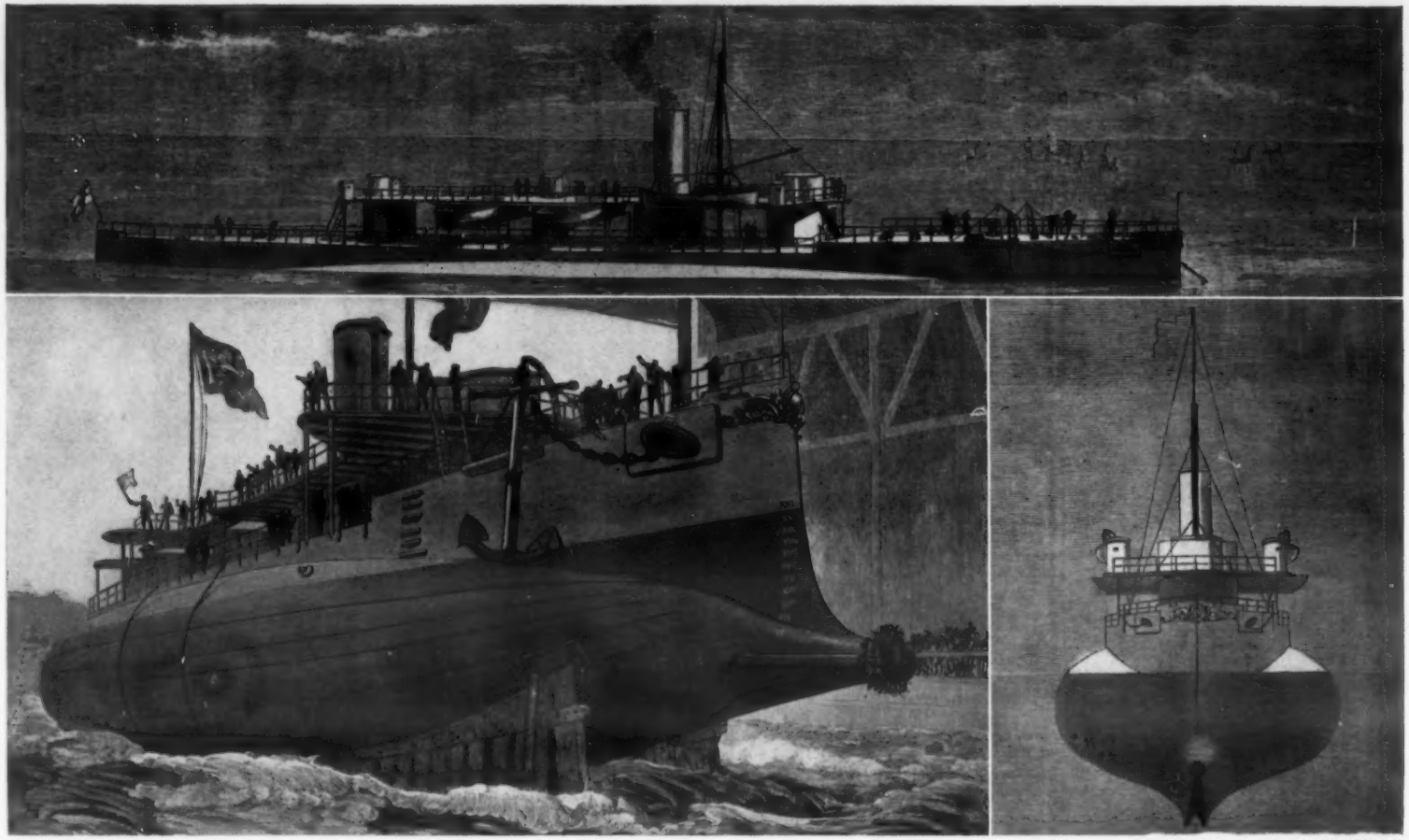


LAUNCH OF THE *AFFONDATORE*, IRONCLAD CUPOLA FRIGATE
This frigate was built for the King of Italy at Millwall.

From "Illustrated London News"

Courtesy Fletcher Pratt

UNIV. OF MICH.

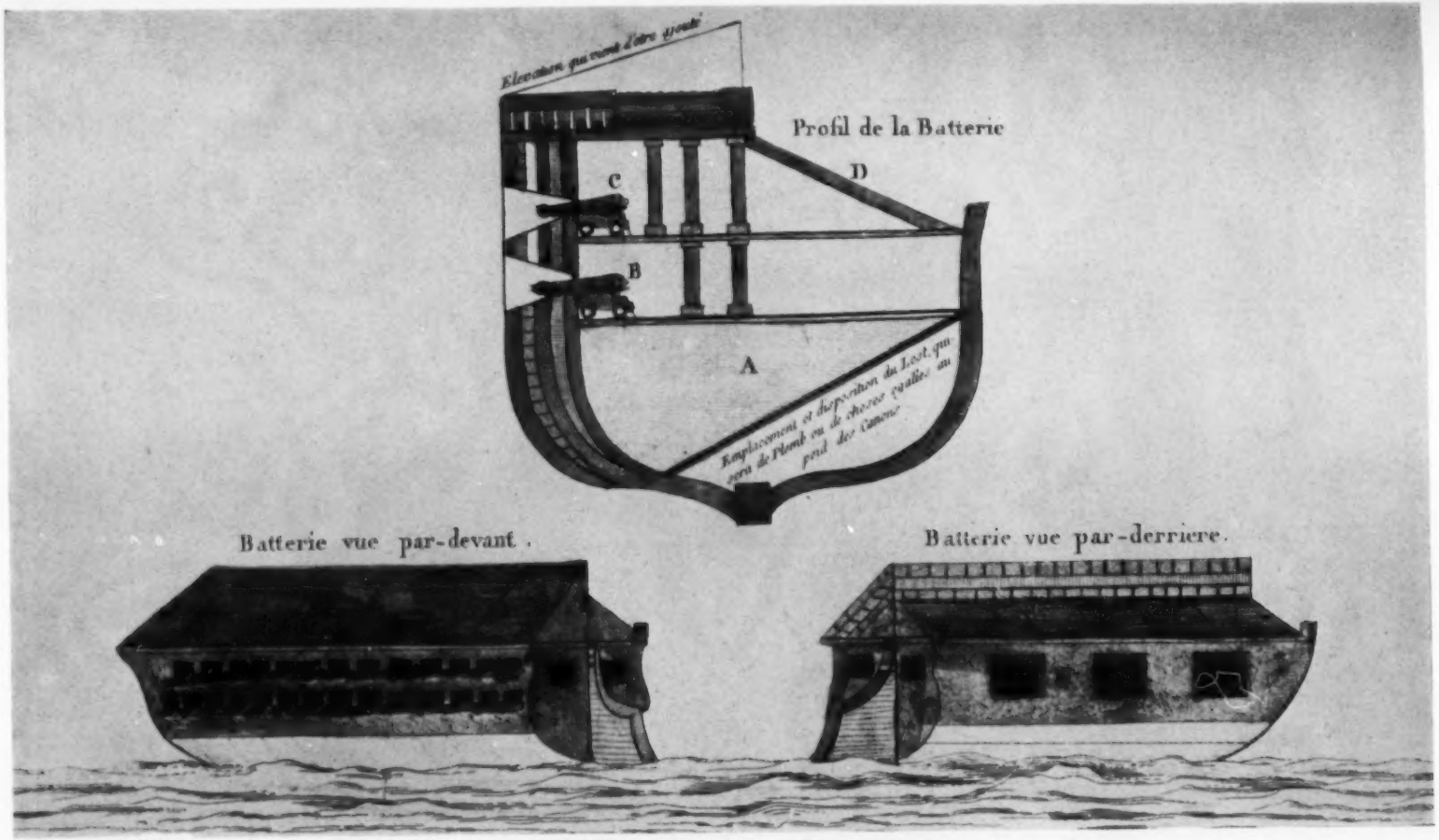


Courtesy Fletcher Pratt

H.M.S. *POLYPHEMUS*, TORPEDO RAM
(Note hull below water line)

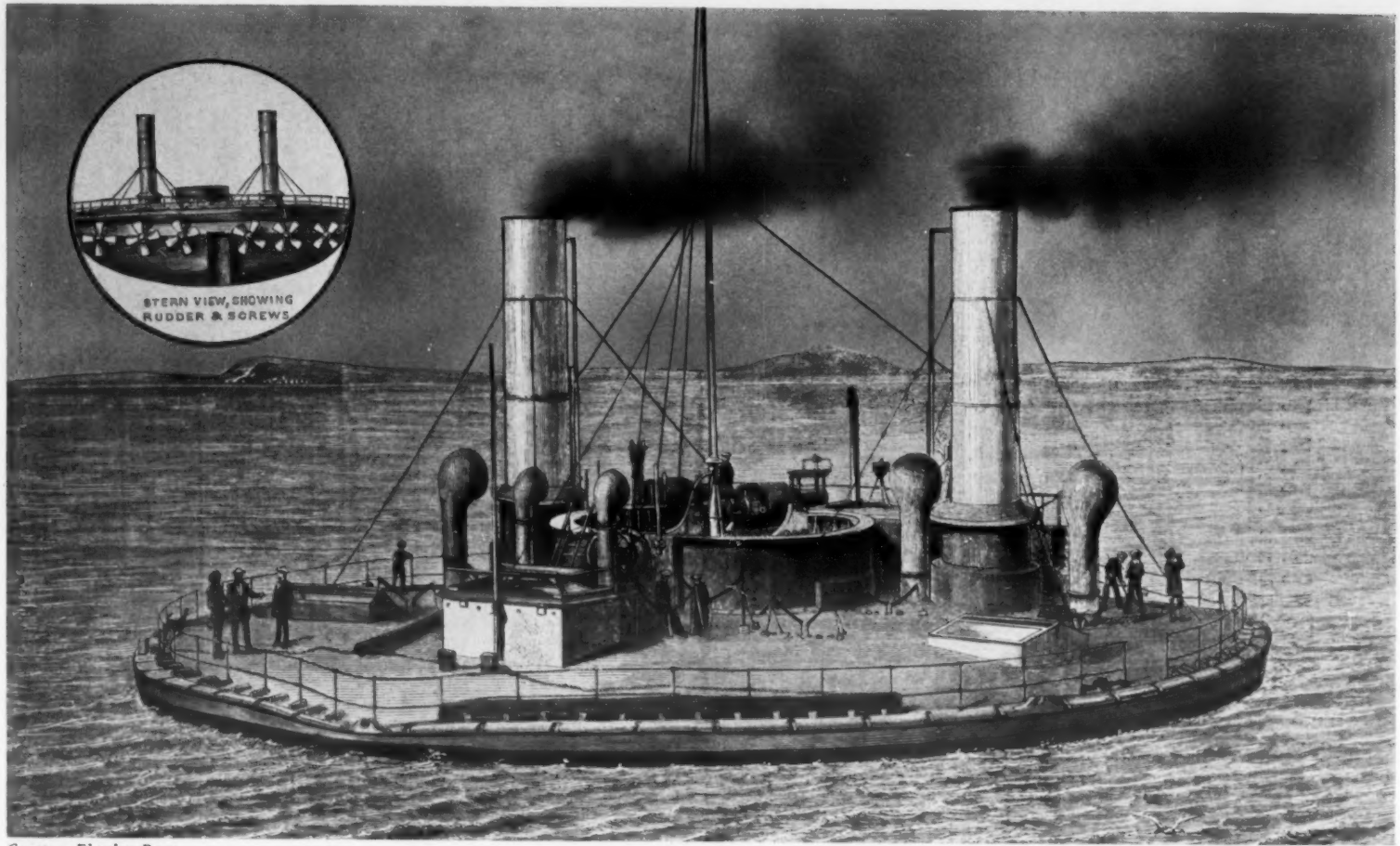
From "Illustrated London News"

H.M.S. *POLYPHEMUS*, TORPEDO RAM
(Note hull below water line)



Courtesy Fletcher Pratt

GIBRALTAR "BATTERING SHIPS"



Courtesy Fletcher Pratt *From "Harper's Weekly"*

THE CIRCULAR IRONCLAD *NOVGOROD*
She was designed by Admiral Popoff, of the Russian Navy.

THE CIRCULAR IRONCLAD *NOVGOROD*
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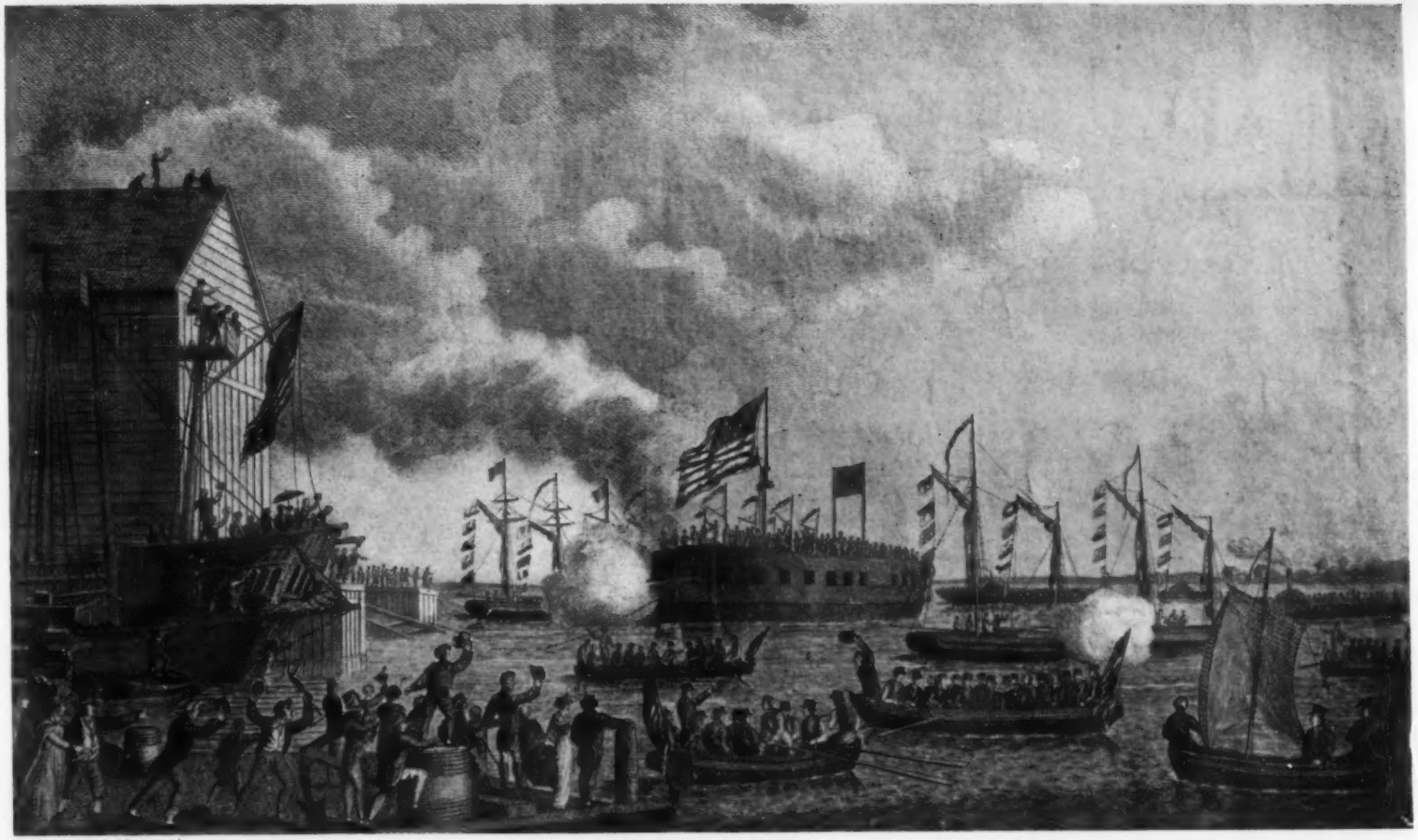
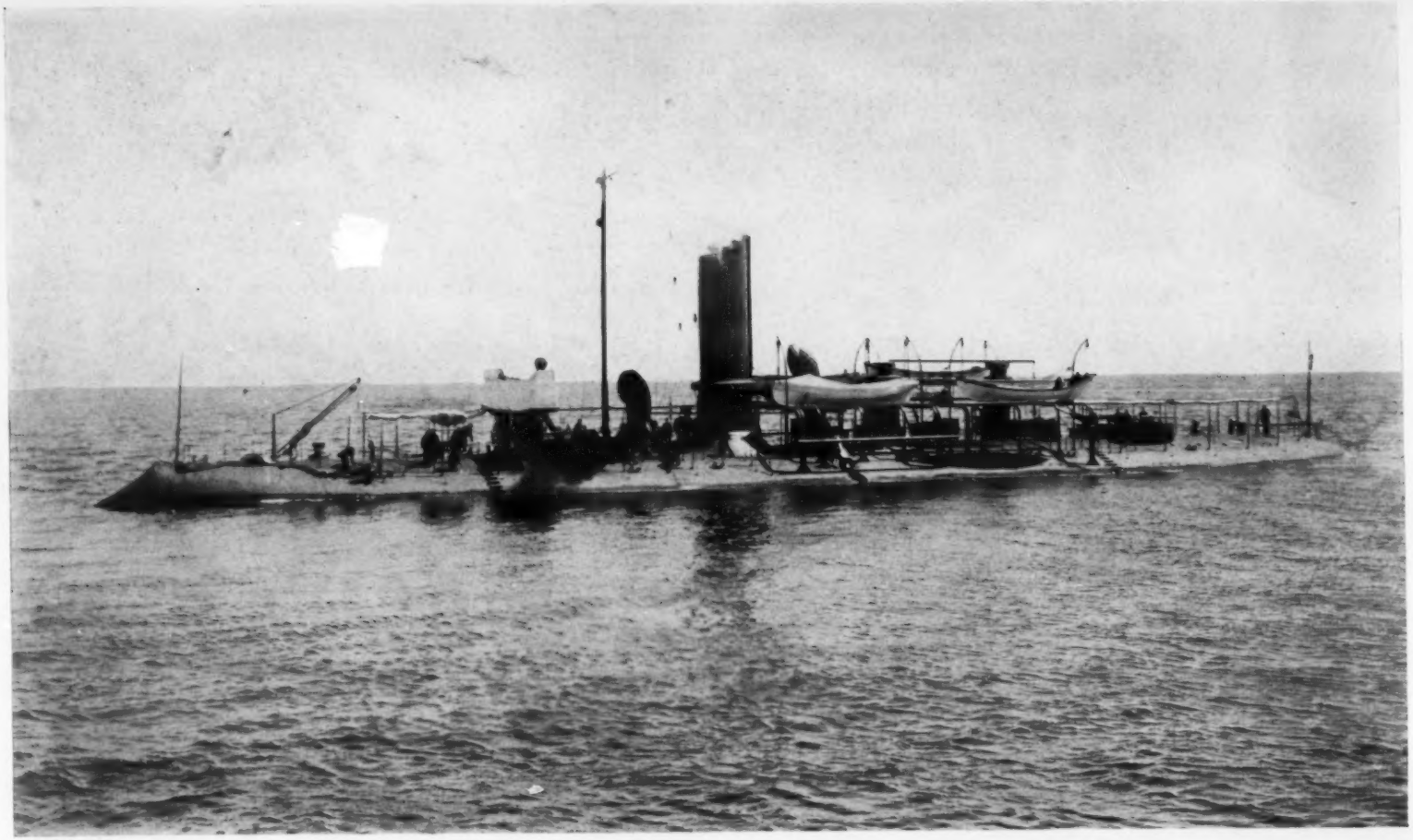


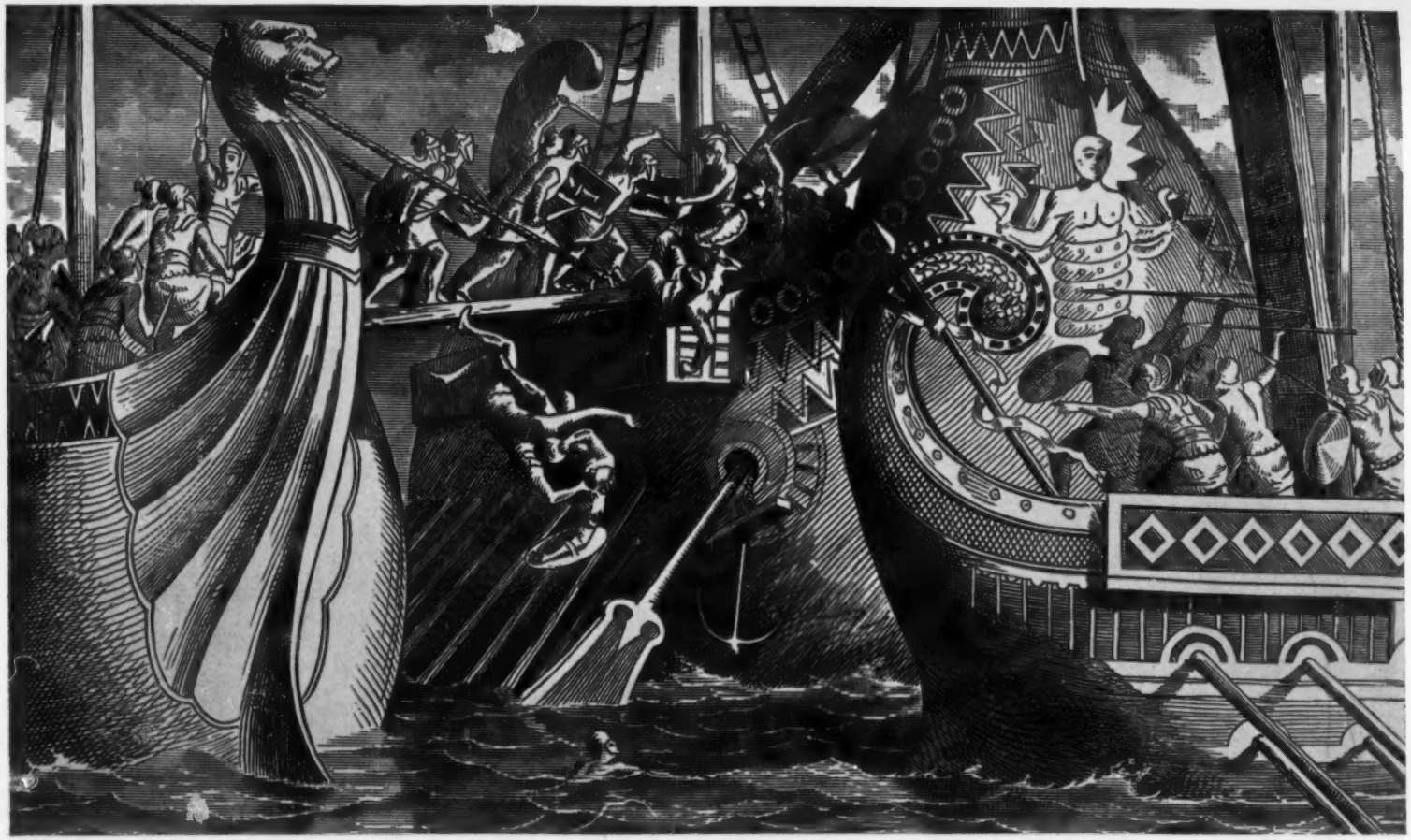
International Newsreel

LAUNCH OF THE STEAM FRIGATE *FULTON THE FIRST*, AT NEW YORK, OCTOBER 29, 1814

UNIV. OF MICH.

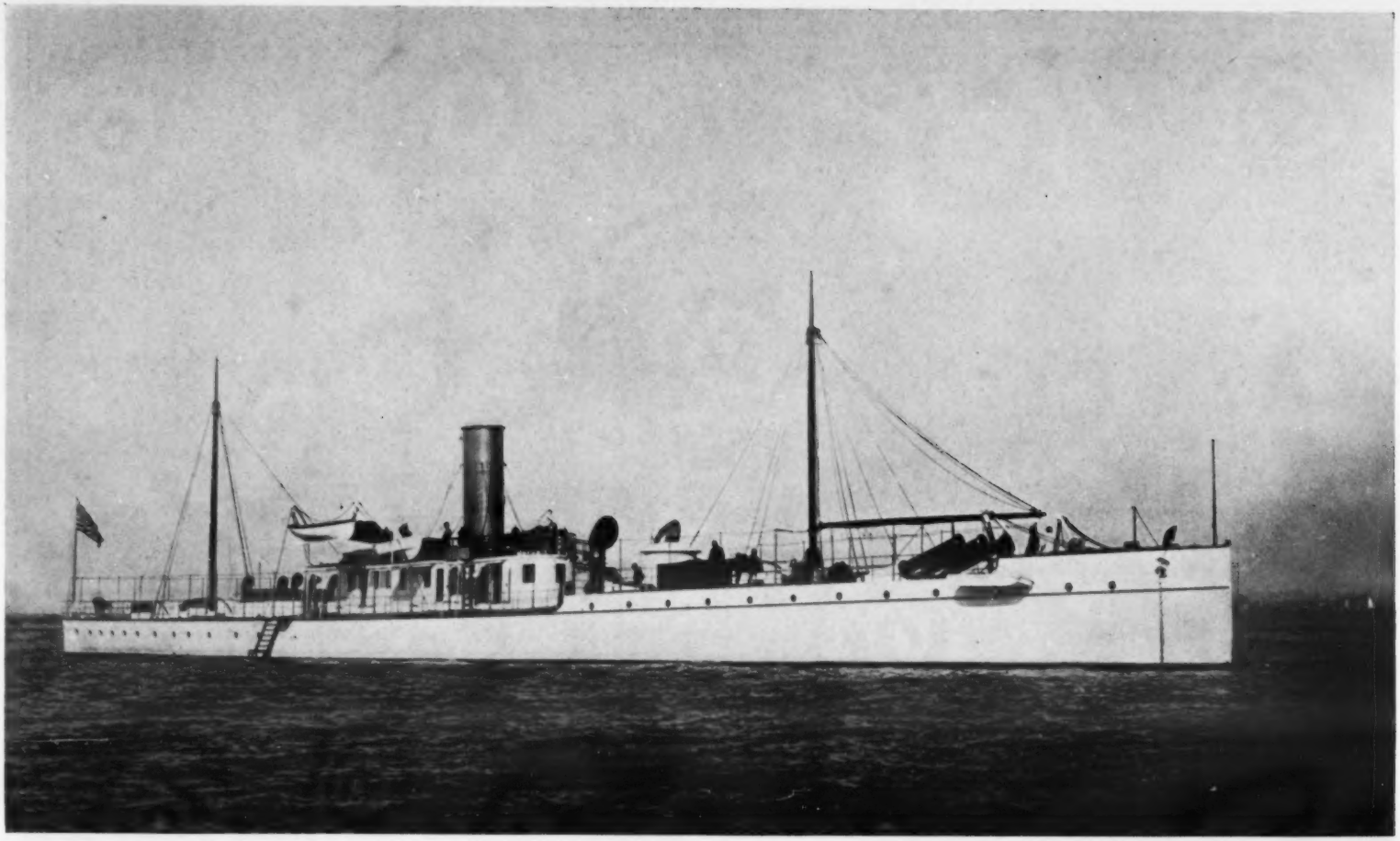


U. S. RAM *KATAHDIN*



THE ROMAN CORVUS

On ship at right notice the corvus in its raised position against the mast.



U.S.S. *VESUVIUS*, THE DYNAMITE SHIP

U.S.S. *VESUVIUS*, THE DYNAMITE SHIP

Courtesy Lieutenant L. Y. Mason, Jr., U. S. Navy

KUNGLINGTAN RAPIDS LOOKING UPSTREAM

Courtesy Lieutenant L. Y. Mason, Jr., U. S. Navy

UPPER END OF ENTRANCE TO WINDBOX GORGE
Wu Pei Fu's home is in the upper left-hand corner.

Courtesy Lieutenant L. Y. Mason, Jr., U. S. Navy

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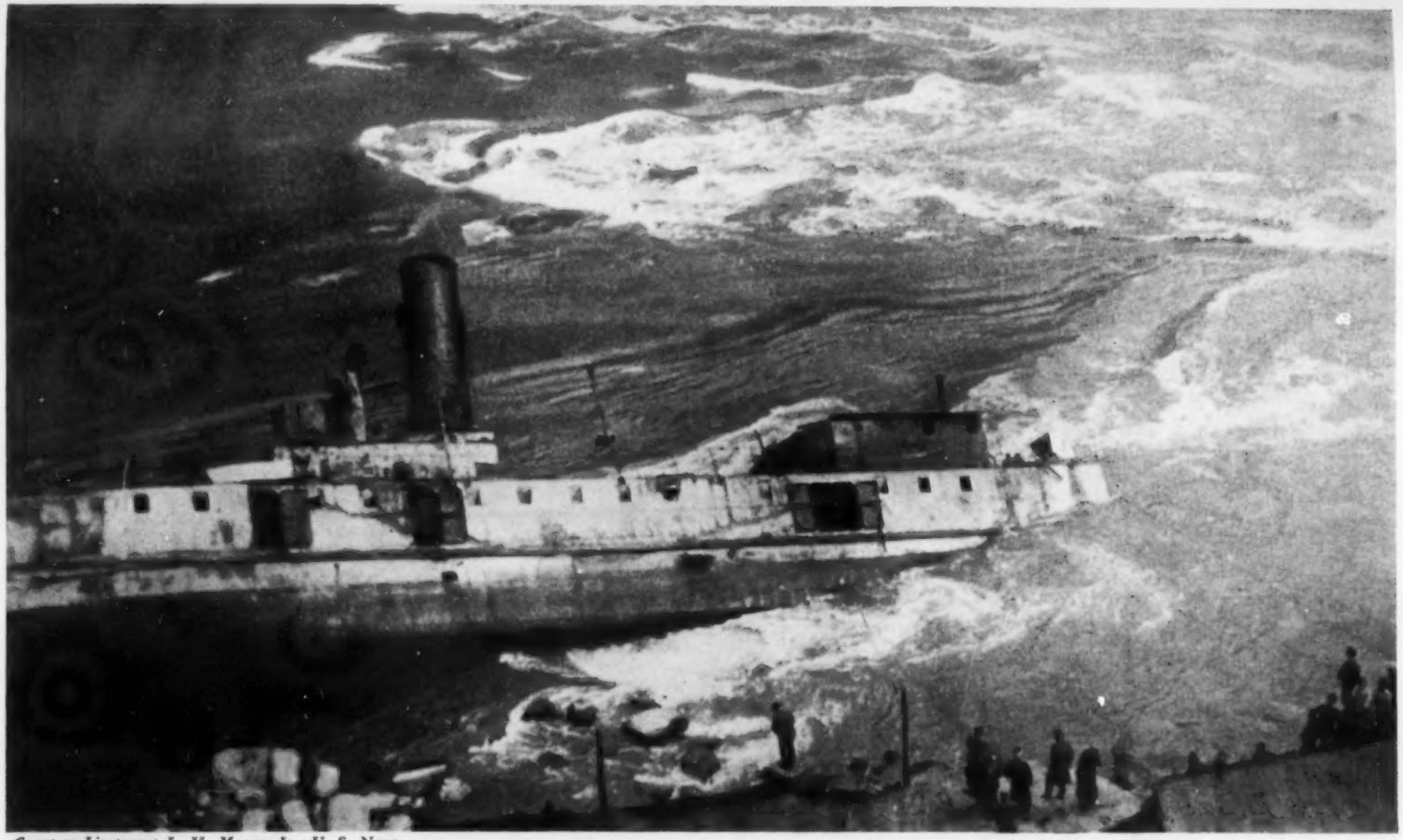
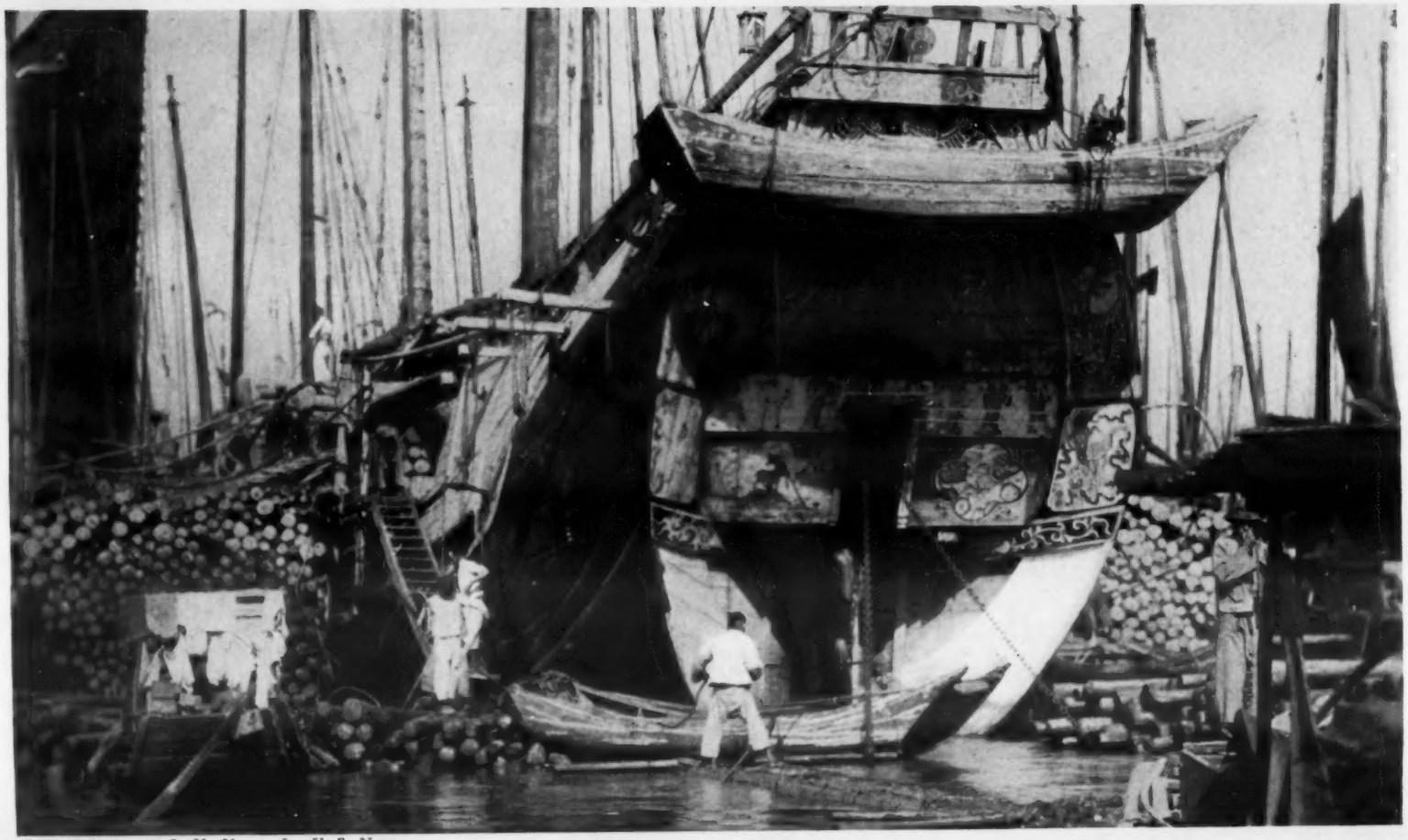


Courtesy Lieutenant L. Y. Mason, Jr., U. S. Navy

WRECK OF SS. *SHUHUO*, HSINTAN, JANUARY, 1930

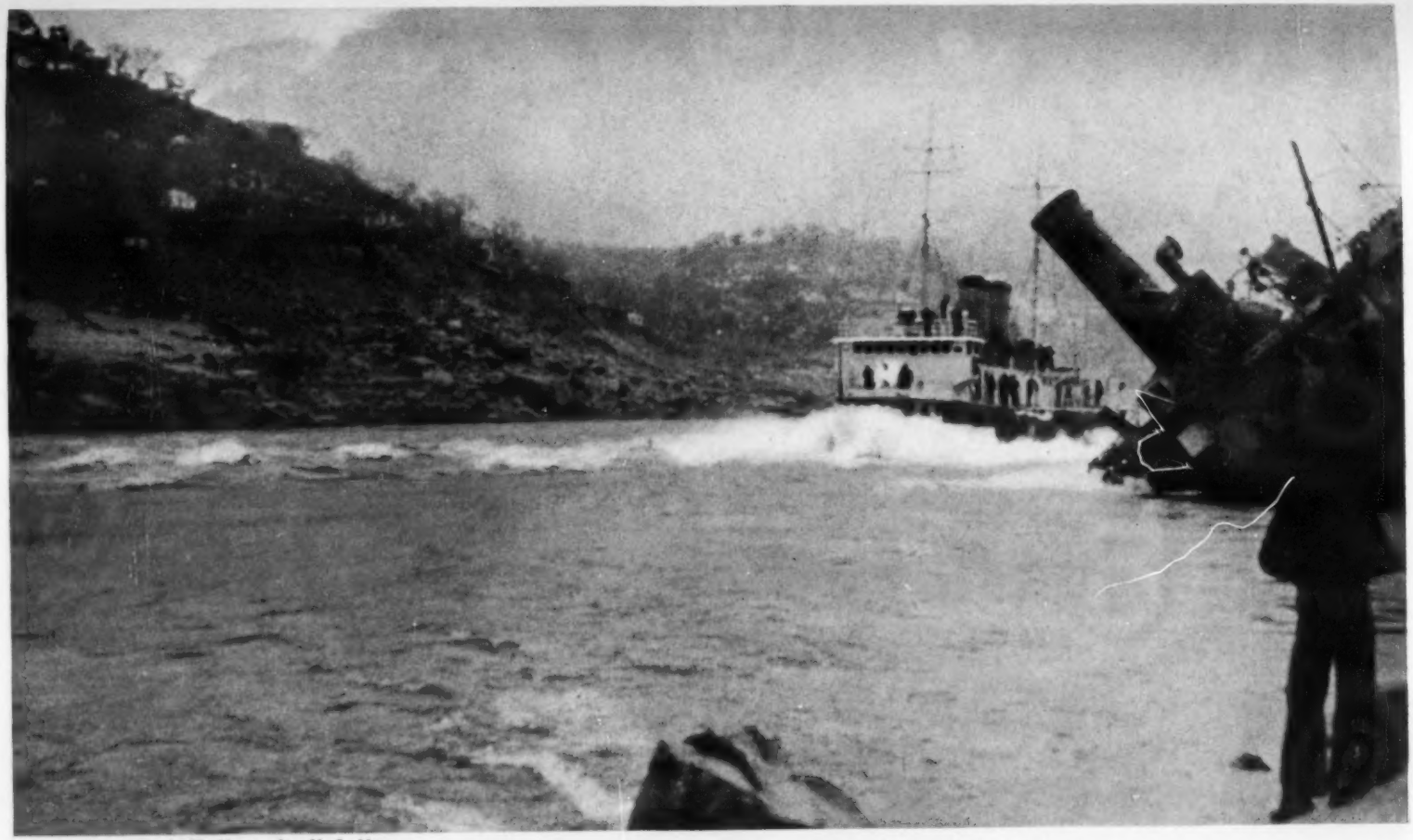


Courtesy Lieutenant L. Y. Mason, Jr., U. S. Navy

STERN OF A SEAGOING JUNK

Courtesy Lieutenant L. Y. Mason, Jr., U. S. Navy

STERN OF A SEAGOING JUNK



Courtesy Lieutenant L. Y. Mason, Jr., U. S. Navy

U.S.S. *TUTUILA* STEAMING PAST THE WRECK OF SS. *SHUHUO*

Courtesy Lieutenant L. Y. Mason, Jr., U. S. Navy

TRACKER'S TOWPATH IN THE WINDBOX GORGE

Courtesy Lieutenant L. Y. Mason, Jr., U. S. Navy

TRACKER'S TOWPATH IN THE WINDBOX GORGE

Courtesy Lieutenant L. Y. Mason, Jr., U. S. Navy

OLD BRIDGE, WANHSIEN

UNIV OF N.

Courtesy Lieutenant L. Y. Mason, Jr., U. S. Navy

U.S.S. *MINDANAO* AT FOOCHOW

The Protection *of* American Nationals *in* China

By COMMANDER ROY C. SMITH, JR., *U. S. Navy*

RED RIOT and insurrection, civil war and communism again rage almost unchecked in China. News dispatches tell of the looting and burning of Changsha, the hurried evacuation of foreigners from Kuling and Kiukiang, of preparations for defense of the foreign settlements in Hankow and Shanghai. To those who served in China during the unforgettable spring and summer of 1927, these stories have a very familiar ring. Again there is brought very much to the fore the problem of the protection of the lives and property—chiefly now the lives—of Americans residing in China. Why and how is this done, and what justification exists for the use of military and naval force in accomplishing it? These are questions which have again become of timely interest, and it is proposed now to examine them.

One of the first duties devolving upon a state is that of insuring protection for its nationals when abroad upon their lawful occasions. An equally urgent duty is that of protecting the lives and property of foreign nationals residing lawfully within its borders. Where this is done, foreign states may consider their duty of protecting their own nationals to be provided for.

But unhappily, there exist in the world various states in which political and other conditions are continually upset, and where there is no stability. In many of these the national government or local authorities are either unable or unwilling to accord proper protection to the lives or property, or both, of foreign nationals living within their borders. In such states and in such cases, from whatever cause they may arise, it becomes the duty of the foreign state to insure the protection it owes its nationals therein residing. This is a duty that the foreign state cannot shirk nor evade without derogation of its own perfect sovereignty, nor can the offending state, having failed in one of its most important international obligations, resent the infringement of its own sovereignty implied in any action which the foreign state may find necessary in the case involved.

These are fundamentals in the relations of states to each other as the world is now organized. And they must remain so until one central government or league governs the whole world. And when, or if, that time ever arrives it will be just as strongly the duty of that supergovernment or league to insure complete protection for all peoples everywhere.

The above is clearly the extreme nationalistic, sometimes called imperialistic, viewpoint of the problem to be considered. There is the other view, which for want of a better term we may call the Bryan view. It was adduced by the late William J. Bryan when Secretary of State, that when an American went abroad to a disturbed region, even on lawful business, he went at his own risk and was not entitled to any protection by his own government. This view is largely held by the pacifist elements in the United States. It cannot be said to have much sanction in international law. Indeed it violates the first principles upon which governments are established, that of ensuring the common defense. The right to that "common defense" exists and cannot be removed, whether at home or abroad.

However, this viewpoint does exist, and it is well to mention it. A very simple method of proving the fallacy of this argument is to consider the matter of foreign trade. It is axiomatic that foreign trade is a necessity in the life of any modern civilized nation. In order to have foreign trade it is obviously necessary that American citizens go abroad to conduct certain parts of the external end of that trade. Particularly is

U.S.S. *MINDANAO* AT FOOCHOW

Courtesy Lieutenant L. Y. Mason, Jr., U. S. Navy

this so in regions where the native inhabitants are not themselves capable of conducting their end of the trade. If Americans are to proceed abroad upon these errands, it is obviously necessary for the success and continuance of the trade that they be protected in their lives and business. If no protection be given, none will wish to go abroad and foreign trade will languish. The Bryan view is thus seen to be fundamentally opposed to the idea of foreign trade. Granted the necessity, or even desirability, of foreign trade, this view is therefore wholly untenable.

The United States has from time to time been forced to take active steps in the protection of its nationals in various countries in Central America, and in China. At present, conditions in the Americas are showing a very gratifying steadiness, so that the only region where necessity for intervention or local action is likely to arise appears to be China. There danger, and great danger, does exist, both to life and property, due to the local or general inability, or unwillingness, or both, of the Chinese authorities to afford proper protection to foreigners legally residing in that country.

In times of trouble in China, danger usually exists for all foreigners equally; therefore we usually find the major powers working together, a vessel of one nation affording protection, when necessary, to any foreigners whose lives may be in danger. In all but the major ports of Shanghai and Tientsin (and Peking) protection must be afforded by small gunboats and other naval craft, which are tied to the coast or navigable waterways such as the Yangtze and certain tributaries, and the West River in the south. Persons in the interior have either to be taken out, or if they will not come out, left to suffer, the country being too vast and the forces involved too large to send land protection in to them.

It is obvious that the maintaining of expeditionary forces in Chinese ports, and of cruisers and gunboats on her coasts and rivers is a derogation of proper Chinese sovereignty. But as previously brought out, China having failed to afford protection to life and property of the foreigners legally within her borders, this duty must perforce be undertaken by the foreign nations concerned. And until China herself shall afford the necessary protection, she cannot object that foreign nations perform what she herself does not perform. She cannot claim violation of her sovereignty when in a most important duty pertaining thereto that sovereignty is not exercised.

These operations in China may perhaps be divided into two main classes: (1) where actual protection is given to life and property, (2) cases where trouble having occurred suddenly, a ship is sent to investigate and demand reparation or guaranties. And the first class itself falls into further divisions: (a) where foreigners are evacuated from a threatened area, leaving real property unguarded, (b) where foreigners are concentrated in certain easily protected places, ports, compounds, buildings, etc., and (c) where a landing force is put ashore to guard property, or where a ship in port by its presence and threat of force is sufficient to ensure safety. This last is by far the most frequent.

There are also cases in which very large property interests and large numbers of foreigners are concerned, such as Shanghai and Tientsin. In these two cases a considerable international expeditionary force has been sent to establish military occupation of the areas involved, in order to prevent entirely the entry therein of Chinese armed forces. The result has been that wealthy Chinese from other parts of China have sought shelter in great numbers in these two ports. Nowhere else are they themselves safe in their lives, families, or property. These expeditionary forces have protected many more Chinese from their own people than foreigners from the Chinese—which is an element in the situation usually overlooked by the critics at home. They apparently cannot realize that often only under the protection of foreign military force has there been any safety for anybody in China.

As the sending of ships to troublous areas with the idea of exercising moral suasion is by far the most common method, we will consider that point.

The maintenance of ships of war on the Chinese coasts and rivers is an ancient treaty right, demanded in order to afford protection to trade and missionaries, which protection the Chinese authorities have seldom been able to insure. In the old days the suppression of piracy was a main reason and indeed it still is (only the piratical methods

have changed somewhat). At present their presence is always necessary as a restraining influence on local war lords or bandits. For this reason all powers maintain patrol vessels, gunboats, destroyers, and small cruisers, in Chinese waters.

The usual procedure is somewhat as follows. It appears to a consul in some port that local conditions have arisen or are about to arise which might cause danger to American life or property. He will first appeal to the local government, if any, or to the local military leader, for proper protection. Often this will be forthcoming, but equally often not. Thereupon he will notify the nearest consul general and the American Minister in Peking of the situation and request a ship sent there. This request is considered by the minister and if he deems the situation to call for it, he will request the naval commander in chief to furnish a vessel (in the Yangtze, the commander, Yangtze Patrol). This, the commander in chief will usually do, sending a ship or ships, or going himself, as the exigencies of the situation and the service warrant.

Upon arrival in a port the commanding officer will at once go ashore to see the consul, or the consul will come out to the ship, depending on relative rank. The whole situation will be gone over, local foreigners interviewed for their impressions; often visits are made to consuls of other countries as they generally have information of value. If there are other warships in port, visits will be exchanged among the commanding and other officers, and usually some plan drawn up for joint action. In river ports a general plan for combined action usually exists, being handed along from ship to ship and modified as occasion demands. A good illustration of this is the Nanking plan (discussed later). This same plan slightly modified to suit differing local conditions has been used in other places, and probably shows the principles involved as well as any.

If no plan exists, the first step after the preliminary visits will be for each ship to draw up its own Navy's version of an "estimate of the situation," which will be based upon all obtainable information as to topography, forces involved, number of foreigners to be protected, value of property, feasibility of protecting and defending any certain area or compound, attitude of the Chinese, probable eventualities, etc. If possible, touch will be gained with local Chinese authorities, civil or military, and the situation discussed with them. They will usually promise fullest protection, but as the people who promise are generally those with no power to perform, this usually does not mean much. The civil officers charged with protection of foreigners are called the commissioners of foreign affairs, and these gentlemen are usually very agreeable and willing to do what they can. But they have no power over the military, and not much control over the local civil government, police, etc., so that their efforts, while usually sincere, are often unavailing. It is particularly in turnovers of authority that most of the danger lies; defeated outgoing or victorious incoming troops alike being given to pillage and antiforeignism.

In such cases the presence of a warship, obviously ready for any trouble, is very apt to be a good deterrent. A consular guard may be landed and, if necessary, foreigners concentrated in the consulate or other suitable compound. True this leaves much property unprotected, but this cannot always be avoided. Life is always the first thought.

One form of property that usually can be protected is oil installations. These are generally along the water front and often a ship can go alongside the docks or pontoons, and if necessary post sentries along the walls to keep out intruders. I know of no case where this method has failed of results. It also usually serves to keep the company's coolies at work instead of going off on strike. They feel themselves protected there against murder, rapine, and enforced enlistment, or in some cases where bolshevik influences are present, they are sufficiently in awe of the foreign ship to behave themselves in her presence. This is the method generally used in the Yangtze, for instance, where the Standard Oil Company of New York and the Asiatic Petroleum Company have large installations all along the river. Foreigners, in cases of danger, often move into these compounds to live.

Perhaps the most complete illustration of the whole procedure is to be found in considering the Nanking affair of 1927. The situation there in March, 1927, was set forth in the present writer's article "Nanking, March 24, 1927," in the PROCEEDINGS of the U. S. Naval Institute for January, 1928. The outline plan of action to be taken in

various eventualities, which has not previously been published, is given as a good example of the structure and method of international coöperation in these cases.

Outline Scheme of Action in the Event of Interference With Foreigners at Nanking

Arranged by senior British, Japanese, and American naval officers present in collaboration with the consuls of the three powers.

The probable eventualities and the action required to meet them are considered to be as follows:

Probable Eventualities

The most likely eventualities would seem to be:

(1) Withdrawal of troops—possible looting.
(2) Retreat of troops in disorder after actual defeat—looting certain and serious risk to foreigners' lives.
(3) The city of Nanking being the field of action.
(4) Occupation of Nanking by Southerners, and stirring up of antiforeign feeling.

Sequence of Action Necessary

The several steps of action to be taken to cope with these eventualities are:

First Step. Women and children to be evacuated before serious trouble occurs.

It is extremely desirable that the decision for this step should be simultaneous for the nationals of all three countries and other foreigners; but it is *essential* that it shall be taken in good time.

Second Step. Outlying male foreigners who remain behind to be concentrated in districts where effective armed protection can be given if the necessity arises, which means abandoning a certain amount of property.

Third Step. Withdrawal of all nationals to the hulks or to ships in the river, which means abandoning all property.

Outline of Action Required in Each Case

First Step. Lists to be prepared of each country's nationals to be divided into groups, each with a group leader, so that consular orders can be quickly conveyed. If possible a warning will be passed round before the executive order to evacuate. Each group leader to be responsible that all members of his group receive these messages and carry them out.

Safest and most convenient time for evacuation is considered to be the early morning, the order having been circulated the previous day.

The respective consuls will as far as possible make arrangements for certain foreigners' private motor cars or Chinese hired cars to assist the evacuation.

Those being evacuated to come to the bund independently, British and Americans to Butterfield and Swire's hulk, and Japanese to N.K.K. hulk, where they will be taken off in men-of-war boats and shore launches. River steamers will be requisitioned for passage to Shanghai, temporary accommodation being afforded in men-of-war if necessary.

A strong armed party depending on numbers of men-of-war present will be landed from each man-of-war at points of embarkation during time evacuation of women and children is taking place. These armed parties will not be sent further afield except in emergency.

As soon as decision to evacuate women and children is taken, visual signal communication will be established between men-of-war and their respective consulates, Standard Oil Hill being used as connecting link.

At the same time an officer will be sent to each consulate.

Second Step. This may be done concurrently with First Step, or subsequently.

On receipt of directions from their respective consuls the male foreigners will concentrate where protection can be afforded.

In the case of those being looked after by the British this will be the British consulate and the International Export Co. (Hogee).

In the case of American subjects in the vicinity of Standard Oil Hill this will be the Standard Oil houses.

In the case of Americans in University area, and other foreigners who wish, this will be the University grounds.

Guards will be landed, the British undertaking the protection of British Consulate, Standard Oil houses, and International Export Company (Hogee); American and Japanese guarding their own consulates, and Americans guarding University compound.

Those Japanese living inside the city will be concentrated in the Japanese Consulate, and those living in Hsia Kwan in the N.K.K. hulk.

Third Step. The male foreigners will be escorted by their guards to the embarkation points, proceeding by the New Gate route, past the Yangtze Hotel, direct to Butterfield and Swire and N.K.K. hulks.

The International Export Company (Hogee) will probably be evacuated at the same time.

If simultaneous evacuation is decided on by the three consuls, arrangements will if possible be made for the Japanese to start first, picking up the American and British contingents on the way.

While the evacuation of male foreigners is taking place a strong guard will be in Butterfield and Swire's hulk and the N.K.K. hulk to hold points of embarkation. If necessary the New Gate will be kept open.

Foreigners at Pukow

The British men-of-war will undertake the protection of foreigners at Pukow.

When the time came this scheme worked well, except that it was impossible to guard the University grounds, and that the Americans, not the British, actually guarded the Standard Oil house on Socony Hill.

While on the subject of the Nanking incident, although not strictly within the scope of this article, it may be well to consider its results on the policy of the Nationalist Party. Up to that moment, from the very beginning, the Kuomintang had been very communistic in tone, and had appeared com-

pletely under the guidance and dominance of the Soviets. The firm and decisive action taken by the foreign warships at Nanking, and the determination shown by the naval commanders and home governments immediately afterward unquestionably caused the leaders of the party to pause and consider their position. As a direct result of this affair, then, the more moderate leaders such as Chiang Kai-shek, were enabled to get control of the party. Shortly afterward the Russians were dismissed, and the party, although with considerable difficulty, was purged of communism. When this was done the open hostility of the Powers was no longer to be feared, and the Nationalists were able to proceed with their conquest of the North and the theoretical unification of the country. Had the antiforeign communists remained in the saddle there can be little doubt but that intervention on a large scale would have been forced upon the Powers.

Thus, firm and effective protection to foreigners is seen also to be of great value to the Chinese authorities themselves. What would have happened all over China had not prompt and decisive action been taken at Nanking is not a pleasant subject to speculate upon. The consequences of an event, itself important at the moment, are often seen to loom large and more important as time goes by.

Another good example of protection afforded in time was shown at Anking, on the Yangtze between Wuhu and Kiukiang. Anking is not a treaty port, and in consequence no business men live there, and there are no oil or other installations. However, missionaries, having the right to live anywhere, have a good-sized establishment there.

In the spring of 1927 Anking had been occupied by the Hankow communistic wing of the Nationalist party, and as their attitude was extremely antiforeign, the feeling in Anking was running very high against the foreigners, missionaries in particular. The foreigners there, mostly Americans, but a sprinkling of Norwegian and other nationals in the missions, were very determined to stay and make martyrs of themselves, but at last when it appeared that they might really have to accept martyrdom, they called for help.

U.S.S. *Hulbert* was sent from Kiukiang to get them out. She arrived, fortunately, in a rain, which is likely to keep Chinese indoors (they don't even fight in the rain), landed a small *unarmed* party under a young officer which proceeded unmolested to the mission compound. Most of the missionaries were ready to go out then, and accompanied the bluejackets back to the bund. But by now the communists had taken note of what was going on and had assembled in large numbers. They jeered and yelled at the foreigners and finally began throwing stones and other missiles. Fearing the destroyer in the river, which was ready for action, they did not do any shooting, but several of the party, including bluejackets and one officer, were hit by stones and hurt. However, without any serious untoward incident they reached the shore and embarked. This was a very fine piece of work, requiring great bravery and presence of mind, and determination on part of all concerned.

About half a dozen men and some women refused at the last moment to come out. They remained a while longer and then had to leave, being forcibly removed by Chinese who put them out of their compound and robbed them. They made their way to the shore and got off in a junk from which they were later picked up by a destroyer. In this case the people who came out properly when sent for got away with a large part of their property, those who waited lost nearly everything.

At Changsha, which has just now again been looted and burned, the Yale-in-China school was very cleverly evacuated. Changsha has always been a hotbed of trouble. This time an unusually violent outbreak had started and promised to become worse, so it was decided to evacuate. All women and children got out with much of their baggage and belongings on river steamers sent down for them. A gunboat remained behind, and two or three white officers of the school also stayed. These succeeded in packing and shipping out practically everything in the way of personal effects and goods that the refugees desired sent out. When all was done they turned the school over to the Chinese staff and left, and the gunboat was withdrawn. In the spring of 1927 the entire river above Hankow was evacuated by all foreigners except a few missionaries far in the interior who could not get out. Many men as well as women and children went to

Shanghai and home. Some business men remained in Hankow waiting. When things quieted again some people went back. Other evacuations have from time to time taken place at Foochow, from Fukien province, and elsewhere, the refugees generally returning when immediate danger has passed.

An excellent example of international cooperation occurred at Wuhu just after the Nanking outrage. On March 26 grave trouble was reported. There was no U.S. vessel there then, and H.M.S. *Caradoc,* Captain H. C. Allen, Royal Navy, commanding, was asked to look out for American interests until one could get there. A destroyer, U.S.S. *Noa,* was dispatched from Nanking early on the twenty-seventh and arrived in a few hours, anchoring off the town. The situation at Wuhu was roughly this: almost all the mission and hospital stations on the hill below the Chinese city had been evacuated and were occupied by Chinese radical troops. There were some twenty-five or thirty business men left in town who were concentrated on board the Butterfield and Swire hulk *Peking.* There were about a dozen missionaries including four or five women still left in the stations and in the hospital where they were caring for wounded soldiers. It was strongly desired to get the remainder of these men to come aboard the hulk where they could be protected, and to get the women evacuated down river. A big Chinese demonstration in celebration of the fall of Nanking and as a protest against the firing there by H.M.S. *Emerald,* U.S.S. *Noa,* and *Wm. B. Preston* was planned for the next day. Feeling on shore was extremely antiforeign and trouble appeared inevitable.

The commanders of the British and American ships went on board the hulk and explained the situation to the foreigners there assembled. There was no difficulty with any but missionaries. The American missionary bishop in charge, while agreeing that his people ought to be evacuated, stated that he had no power to order them to do this but could only make recommendations to them. This seemed rather begging the question, in view of the situation, and Captain Allen expressed this to the good bishop in rare old sailor language. It appeared that this was not without effect for the next day the men came in and the women were evacuated.

The demonstration took place next day as planned. Away from the active field of foreign force it was very violent and some damage was done to property. There could be little question but that if the foreigners had not been removed in time many of them would have been killed. Along the bund the rioters behaved in a more circumspect manner as they were under the guns of the foreign warships.

One rather amusing incident occurred on this occasion which is somewhat illustrative of the feeling running at the time. *Noa's* commanding officer had noticed a huge portrait of Dr. Sun Yat Sen painted on the outside of the custom-house tower. He was feeling rather annoyed at the late doctor's adherents at the time, and commented to the men assembled on the hulk that if it came to any shooting there he intended to put his first shot through that portrait. This met with general approbation, except from the Commissioner of Customs, Baron de Cartier, a jovial Belgian, who exclaimed, "For heaven's sake if you are going to do that send me word first. That is my office inside where that portrait is." Fortunately for the good Baron it was not necessary to do any shooting.

The incidents given above well illustrate the methods of dealing with threatened trouble in order to prevent it, or to rescue foreigners from danger when disturbances cannot be prevented. It may be well now to consider occasions wherein trouble has arisen in the absence of naval vessels and to note what steps have been taken to prevent recurrence of the trouble and to obtain reparations for damage inflicted. The British in such cases, are apt to include demands for reparation, and usually get it; we seldom take such drastic steps, but seem to get on quite as well. There was the case in 1924 in the upper Yangtze, where an American had been murdered by boatmen. A British ship, the *Cockchafer,* Lieutenant Commander Whitehorn, was nearest, and proceeded there. He forced the local government to try, and to execute those guilty, and the local leaders to march in a procession of honor to the dead American. For this firm action he was very nearly court-martialed by the British government; only the energetic action of our Yangtze patrol commander, Rear Admiral C. B. McVay, Jr., now the Commander in Chief in

China, in having him officially commended and thanked by our government saved him. It being thus inadvisable to punish him, they did the next thing, promoted him ahead of his time! This incident created the greatest good will in the Yangtze between British and Americans, and particularly the two services, so that coöperation, working together and helping each other when possible thereafter became doctrine, and much extended the available protection that each was able to give its own people. However, each always remained clear of the other's particular diplomatic and national troubles, the coöperation being solely for the purpose of saving life and protecting property whenever possible.

A case in which an American demand for reparation was made occurred in 1924, when an American citizen was murdered by Chinese agitators at Kachek in the island of Hainan off the south coast. A ship of war was immediately dispatched to Hoi How, the treaty port of the island, to obtain reparation for the outrages. A consular representative in this case went along to do the negotiating.

The facts in the case were well known, the assassins, local bandits, had been identified and their apprehension was possible, and yet it was only with the utmost difficulty and diplomacy, backed by the presence of naval forces that reparation was obtained. There are extensive sand bars off the port of Hoi How and ships must lie in the roads, several miles out. Indeed communication with shore, even by ship's boats, is impossible except at high water. This undoubtedly had much to do with the dilatory attitude of the Chinese authorities. However, in the long run reparation of $10,000 (I think) was paid and the bandits executed. It can hardly be doubted that without the firm stand taken, and the presence of naval force, nothing whatever would have been done.

Another example of action taken to adjust difficulties and to prevent further ones occurred in 1926 in the same place. At Kachek there is a Presbyterian mission establishment consisting of school and hospital and at Nodoa on Hainan a similar establishment. At Kachek there had been some long-standing difficulty over a road through the mission, which the missionaries had closed, giving up in exchange a portion of their land for a new road. When the Cantonese forces captured the island early in February, 1926, after their usual custom, they immediately began agitation against foreigners. The old road question was rehashed and mobs easily incited to attack the compound. An American flag flying over the hospital door was torn down and trampled upon, Chinese attendants in school and hospital were beaten and considerable damage was done to the establishment. At Nodoa troops occupied the mission compound causing considerable damage and offered various indignities to foreigners there, including one elderly lady.

Due to lack of communication facilities, news of this incident was rather slow in coming out. It was almost three weeks later that a ship was sent to Hoi How to investigate. By this time feeling had quieted down, the riot at Kachek had been suppressed, and the troops removed from Nodoa. However, the situation of the foreigners was still extremely precarious, and most had come out of the interior, except the old lady at Nodoa who, in a visitation, had been informed that she was to achieve martyrdom there, and seemed determined to do it.

In this connection it is to be noted that British consular authorities have power to order their nationals to evacuate disturbed areas, and means to enforce their orders. Ours have not, and can only make recommendations. The problem, from the naval viewpoint, would be simplified if our consuls possessed the same authority as do the British. By disregarding consular advice and stating that they do not wish protection, that they will take their own chances, Americans cannot absolve their government of the duty of protecting them. They merely make the exercise of that protection infinitely more difficult. This is a phase of the question that such people do not seem to understand. It exists, and is a fact, nevertheless. Such was the old lady's case.

To resume, the commanding officer of the destroyer after a conference with the Commissioner of Foreign Affairs was enabled to satisfy himself that satisfactory reparation had been made and that the immediate danger was not great as long as foreigners remained in the vicinity of Hoi How, and lastly he obtained an official expression of regret for the incident. Arrangements were suggested, however, by which vessels of war, British or American, would stop at

Hoi How at intervals to have a look into the situation. Just lately, I believe, there has been more difficulty in Hainan but the island almost completely escaped the severe antiforeignism prevalent elsewhere in 1926-27-28. This was probably due to many causes but not the least among them was the promptness and firmness with which the early difficulties had been settled.

Promptness and firmness! These are the two major factors of success in dealing with backward and troublous peoples.

In all the above attempt has been made to show what has been done in various cases, so that some doctrine may be found. Perhaps all we can find is the certainty that it *is* the doctrine of the United States to protect her nationals wherever they may be, and in whatever way the immediate situation may demand. Diplomacy is used, firmness, backed by force, but force only as the ultimate resort when all other means have failed, when immediate and drastic action is necessary, as at Nanking. "Do what the situation demands" seems the rule, and perhaps this is best epitomized by that tale of the commander of an earlier American naval vessel. He was sent to a Chinese port to obtain redress and apology for some outrage. He sent a boat ashore with the word that his instructions were in two parts, and the first was that he was to give the local authorities twenty-four hours to make the required reparation. He waited twenty-three hours and nothing happened, so he sent another boat ashore with the message that as the time limit was nearly up, and no action had been taken on his demands, in one hour he would regretfully be compelled to comply with the second portion of his orders. Immediately a Chinese boat came out with the local magistrate and the desired reparation was made then and there. As the mandarin was about to leave the ship he stopped for a moment at the gangway and inquired:

"By the way, Captain, what was the second portion of your orders?"

"Oh," replied this diplomatic sailor, "if my demands were not complied with in twenty-four hours, I was to depart and take no further action in the matter."

A splendid bluff! But be wary of them now, they are liable to be called.

Uniform *and the* Enlisted Man

By CAPTAIN C. S. FREEMAN, *U.S. Navy*

If any pilgrim monk . . . . from distant parts . . . . find fault with anything, or expose it, reasonably, and with the humility of charity, the Abbot shall discuss it prudently.
—ST. BENEDICT

"YOU should be proud of your uniform," said the captain. "I am in a way, sir," said the offending man-of-war's man, "but I wish I had a uniform I could be prouder of."

It is not a simple matter to approach the subject of enlisted men's uniforms. The uniform has nothing to do with strategy, its relation to tactics is somewhat remote, it is not deeply concerned with logistics. To discuss it on a high intellectual plane might involve a psychological analysis of the effect of uniform on fighting efficiency and its reaction on various temperaments. Such a discussion might well be fruitful, but on the other hand it would doubtless lead us quickly beyond our depth. After all, what we are attempting to arrive at is some common ground upon which to present an argument for or against the present uniform of the man-of-war's man and to fight it out on that ground, undeterred by extraneous views that have served so consistently hitherto to obscure the issue.

Unfortunately we cannot arrive at this basis for discussion without first dealing with one of these extraneous points of view, and try as we may we shall find this point of view constantly obtruding itself. We refer to the *sentiment* which is alleged to exist for the present uniform. We had a demonstration a few years ago of how much sentiment weighed in the balance in connection with the black-braided, high-collar uniform of naval officers, a uniform which had become associated intimately enough with the American Navy to be known universally as distinctive of it, albeit derived years ago from a foreign source. It will undoubtedly be generally admitted that a uniform should possess primarily two qualities, distinctiveness and practicality. Now sentiment is an emotion that is awakened by a thing that appears to have worth, according to our lexicographers, and consequently if the present uniform of the man-of-war's man has little or no worth from the standpoint of practicality, then the emotion that some profess to feel for it is not sentiment, but sentimentalism, a rather abhorrent quality, which has been well defined as "feeling, partially enlightened by the intellect, and yet refusing to be controlled by it." It is exactly this difference between sentiment and sentimentalism which must be kept for the moment in the foreground in our approach to a practical discussion of the uniform. Sentiment causes to be retained among some of our distinguished semimilitary organizations, the blue and buff of the Revolution, which is worn with telling effect on parades and at reviews. Sentimentalism sent the French infantry of many regiments into the front line at the beginning of the World War in flaming red breeches against a darker background of blue and black and green, with what disastrous results we know. That it is not sentiment, but the veriest sentimentalism, that holds on to the barn-door trousers of a previous age and the peasant's or workman's jumper of the seventeenth century and before; for the distinctive dress of a man-of-war's man of today can be established beyond the shadow of a doubt by letting the present-day sailor dress himself at will for a time. It is only yachting sailors and men who are compelled by the rules of certain marine companies who deliberately choose an approach to the present conventional man-of-war's man's garb. It is not because other seafaring men cannot secure such outfits. If there were a demand for

flap-front trousers and muzhik's jumpers, they would appear at once in every slop chest and every water-front clothing shop. If sentimentalism is to govern the choice and retention of uniform, let us all shift into perukes and small clothes at once, and have done with it.

If, then, we may dismiss both sentiment and its less lovely stepsister, and begin the discussion of the enlisted man's uniform on a logical basis, we must revert to our generally conceded major premise that uniform should possess primarily the two qualities of distinctiveness and practicality. We have placed distinctiveness first, but it appears desirable to treat of it last, not but what it may be considered the leading characteristic of uniform, but because it represents more the artistic phase of the subject—it may be achieved with a touch—and, like the things of art in general, it yields less to argument and discussion. Practicality, on the other hand, partakes of the scientific phase of the uniform question. It may be approached by the processes of analysis. For instance, let us see what the term itself implies. The first thing that suggests itself perhaps is usefulness. But usefulness is not practicality. The present uniform is usable and useful enough, although it has many useless features, but it is in no proper sense practical, because it is not "adapted to the common affairs of life." Again we are adhering closely to our dictionary definitions. It is in a sense astonishing that the uniform of the man-of-war's man should show so little development along practical lines, when we consider the eminently practical development of the soldier's garb. It doubtless will do so in the future, but not until it has broken with tradition once and for all. The soldier's uniform has followed somewhat a process of evolution, sometimes slow, sometimes very rapid. Every great war has enforced certain practical changes. The sailor's uniform has shown no such evolutionary change. It has failed to grow and develop with the times. In this respect, it has lagged far behind the street garb of many religious organizations where we might expect the traditional and conservative elements to hold greatest sway. Initially no doubt derived from the ordinary habiliments of a longshoreman or merchant sailor, established as to color and fixed as to embellishments, in order to render it distinctive for seamen in government service, it has retained with a singular persistency its original uncouth form, changing only in nonessentials, such as number of buttons here, character of plaits there, or size of eyelets elsewhere. Some analytical historian could doubtless trace a certain relation of cause and effect between the rather weird costume of latter-day man-of-war's men and the classic conservatism of British character coupled with the dominant sea power that has been Britain's since the Dutch wars of the seventeenth century, or from the Battle of Sluys, if we wish to go back so far. Someone more cynical would speak of press gangs, would refer to the times so little long ago, when man-of-war's men stayed on their ships for months on end, and of the advantages that flowed from the ability to round up quickly after the infrequent shore liberties men adrift in a strange garb that fitted nowhere into the common life of the community. However these things may be, the fact remains today that the uniform of the soldier has developed along practical lines, so that it fits into the living scheme of things as they are, while the uniform of the man-of-war's man has suffered from arrested development to such an extent as to make the uninured victim of the uniform feel like a man of another species and of a forgotten age. It is noted that we do not say the uniform of the sailor when contrasting the type of uniform under discussion with the uniform of the soldier. The merchant sailor as a type has followed conventional lines. His garb is practical, "adapted to the common affairs of life," his own life primarily, but the life of the community also. He wears the ordinary man's trousers with the fly front. Generally he wears a belt. His shirt is soft, generally of flannel, because that material is durable; sometimes of gingham, because that is comfortable. He wears a soft or pliable hat or cap that offers no grip for the wind, and in thousands of cases it will be found this cap has a visor, because the visor furnishes the desirable shade to the eyes which is welcome to all men. The soldier is more distinctly in a class by himself than the man-of-war's man. There is no closely related type, like the merchant sailor, with which to compare him. And yet let us take the hunter, the trapper, the civil engineer and his workers. Note the garb these men se-

lect and compare it with the soldier's equipment. Point by point the apparel of these classes is found similar insofar as their vocations are similar, and, what is most pertinent to the matter at issue, their apparel fits into the accepted scheme of clothing of our present civilization. It is an important point—this fitting of uniform into the accepted scheme of things. Uniform is measurably conspicuous in any case. It is the intention that it should be. To make it eccentrically conspicuous is to place an unnecessary burden of self-consciousness upon a man who is surrendering much of what he considers his own proper independence in rendering military service in time of peace. We may pass over periods of war when any uniform is accepted. It is the peace-time situation and the building up now of naval personnel to its allowed strength and desired quality that we are chiefly concerned with. That the naval uniform is eccentrically conspicuous was tacitly conceded when, before the World War, enlisted men were first permitted to wear civilian clothing on liberty. There will always be a certain proportion of men who will desire this privilege no matter what the uniform is, will in fact, take it without its being granted. But the pressure for the granting of this privilege did not, for instance, come from the Marine Corps, where a practical and distinctive uniform was one of the marked features of the corps. The pressure came from the humble person who has latterly been called a "gob," but who we do not believe would ever have been accorded and who scarcely would have accepted such an uncouth title were it not for the uniform he is compelled to wear. Is it true that the man-of-war's man has consistently resented the epithet "jackie," because it belittles him, and largely acquiesces in the epithet "gob," because—well, because it describes him—his appearance, at least—to himself?

Some attempt has been made to show that the present man-of-war's man's uniform has not that large quality of practicality which is essential to all uniform, the quality of adapting itself to the common affairs of life. We shall grant it distinctiveness without discussion. It is now proposed to analyze it somewhat more in detail. It must, of course, be understood that we are discussing, not the uniform of chief petty officers, nor the extremely rational outfits prescribed for officers' cooks and stewards, but the very complicated and unnecessarily numerous garments prescribed for the remaining ratings of the Navy, which go to make up the bulk of the personnel. In bringing an indictment in detail against the uniform of the Navy, it is difficult to know where to begin. One wishes to say, "It is all wrong." It is, in fact, almost what we propose to say later. But for the present:

The uniform has developed illogically and consequently lends itself to the many eccentricities which are practiced upon it. For instance, let us consider what is officially known as the "overshirt." It has tight-fitting cuffs, which irk men and get themselves turned up willy-nilly. The cuffs are supposed to have certain stripes of exceedingly low-priced material sewed on them and the number of these stripes changes with change of rating. It will be found, however, that we cannot add one stripe to the other as the rating changes, but that first one stripe must be removed and two sewed on, and then two have to be removed and three sewed on. In consequence, men have three sewed on to start with and are at once out of uniform. We examine further and find that this shirt is really cut about the neck after the style of what we have generally been taught to call a jumper, but that, when we run down to its extremity, we find a draw string, the use of which suggests what our mothers used to teach us in our childhood days was a blouse. Now if we cut off the tape of this "overshirt" and alter the sleeves, so that they have no cuffs, we arrive at the "blue undress jumper." Note that there is no blue dress jumper. Again we find the draw string confusing the nomenclature, and the "blue undress jumper" we also wear as a blouse with a two- to four-inch overhang. This overhang, by the way, practically completely covers the many buttoned, barn-door front of the blue trousers. We therefore have the extra expense of this mode of trouser construction with no compensating display of clever tailoring nor any attendant advantage whatever, for the trousers will stay up, if they are fitted properly, whether they have a flap or a fly front. We come next to the "dress jumper," which we may dismiss with a word. It is doubtful whether it will ever regain its place as a working part of the uniform outfit. It has all of the disadvantages of the overshirt, except the draw

string, and has become so associated with juvenile and feminine apparel as to appear wholly out of place in the equipment of a man, although one must reluctantly credit it with greater artistic merit than any other single garment in the man-of-war's man's outfit. There appears now on our list the "white undress jumper." This garment, at least, is properly named, and is, it so happens, undoubtedly a favorite garment among the men themselves. It, however, serves no purpose that another garment more in keeping with the clothing of today would not serve as well or better, and it is certainly of the wrong color, as any garment of white must necessarily be, in a modern military organization.

The white and dungaree trousers have a fly front and conform generally to the modern idea of what such garments should be, although repeated experiences in tropical waters, not to refer to night experiences in the World War, have taught us that white as a part of the outer naval uniform should be unhesitatingly abolished. The jersey has proved its value and propriety by refusing to remain abolished, although the material of which latterly it has been made has not been altogether satisfactory. There may be differences of opinion about the overcoat, but it is, at least, a satisfactory garment when cut properly about the neck. The same may be said about most of the remaining items of the uniform outfit. Shoes have, after years of bickering, departed forever from the brogan type, and are now kept as modern and up to date as it is well possible to keep an item of military uniform. The undershirt is permitted in many varieties, but there is a consistent restriction on sleeveless undershirts. We have listened to various reasons advanced for this restriction, but never have heard one which was adequate. There being already four different types permitted by uniform regulations and certain variations on these types also allowed, it would appear at least in the line of progress to provide a sleeveless type, which is the common type affected by the vast majority of men of the present generation in America. Words are scarcely adequate to express the multiplicity of defects in the blue cap—the flat cap, as it is generally called. It is presumed that this piece of headdress must have had some logical origin, but it appears as little appropriate for ordinary dress on the head of a modern man-of-war's man as would a golden crown on the head of a modern king, and it certainly is much less comfortable.

Our criticism has been mainly destructive, and it is realized fully that there have been advanced only the old and oft-repeated objections that uniform board after uniform board have considered. It is believed, however, that there is required, in order to better the naval uniform for the enlisted personnel, a board which shall be given wide powers and shall be organized on the precept that it is to produce specifications for a distinctive and practical uniform which shall meet the specific needs of the modern Navy and the modern man-of-war's man. Uniform boards, in the past, have been handicapped by an initial restriction calling upon them to modify the uniform. Such has been the precept or the spirit of the precept. Such at least, has been the atmosphere in which they worked. Occasionally they have produced one garment or abolished another garment, often with the most indifferent success, because, after all, the uniform, with all its defects and all its lack of meeting modern requirements, has a certain artistic entity, which can readily be marred by changes which consider only a part and not the whole. A faultless suit of pajamas does not go well with a high hat.

Out of the toil and sweat of many boards, and through much backing and filling, certain changes have been wrought. Through a study of these changes, we may gain a knowledge of certain tendencies. These tendencies, barring certain yieldings to the eccentricities practiced by the tailors or the wearers of the garments, have indicated a straining toward the modernizing of such features of the uniform as can be modernized. The flap front, many buttoned white trousers went years ago. This was a concession more to the tailor and laundryman and their difficulties than to the modern idea in clothing. But we must not scrutinize too closely our benefits, nor must we fail to note the tendency. The tendency clearly is to do away with the many buttoned flap front. The overshirt was once a shirt with real tails, carried inside the trousers. The entire top of the trousers was in plain view. Many were the vexatious minutes spent by the officer of the deck inspecting liberty men and sending many of them forward to

pass the lacing in the back of the trousers up instead of down, or was it down instead of up? At present, the overshirt is a blouse, with a draw string and a two- to four-inch overhang. And the modern man-of-war's man, quick to take advantage of this opportunity and irrespective of whether the overhang is one, five, or seven inches, wholly conceals the many buttons and the rear lacing of the trousers, and presents to the world what appear at first glance to be perfectly modern men's "pants." Why, in the name of modernity, do we not give him what he craves for? Many such tendencies toward modernity might be traced out. Shoes, as noted, have been completely modernized. The "bell" in the trousers has almost disappeared. Who ever saw a modern man-of-war's man pull the bottoms of his trouser legs up over his thighs? Socks are up to date, and underwear, lagging a little, will arrive with the sleeveless light undershirt. There can be little criticism of the white hat and watch cap for their purposes, except the color of the former, which should conform to whatever is adopted as the standard for summer or tropical wear.

And so we swing about the circle and come back inevitably to the one garment and its adjunct which characterize, while rendering obsolete, so far as practicality is concerned, the whole naval uniform. We refer, of course, to the overshirt or jumper and the flat cap. Few, if any, will hold that the flat cap is a practical seagoing item of uniform. It is not worn aboard ship, except at inspections. Its use is frequently avoided even on parades and at reviews, because it is retained on the head with such difficulty, and the requirement that a chin strap be fitted to it is very rarely observed. It is then essentially a part of the liberty or shore-going uniform. Let us keep that fact in mind. Now for the overshirt or jumper. The jumper (except in name) is not a modern article of clothing. Originally a garment in almost universal use among workmen of various countries, it has gradually passed out of general use, although still found among certain of the peasantry and working classes of continental Europe. The name is used in this country to denominate in some communities the ordinary coat-cut or shirt-cut top garment of a workman's overalls, but seldom indeed is the real jumper or smock type of garment found. The jumper orginally was at once a coat and an outside shirt. In fact, it was the outer upper working garment, and the class or caste mark of the worker or peasant. The next class above the worker added a second outside garment and the jumper became a shirt. This ancient line of development is indicated by the coat and shirt of the chief petty officer of today. When a man wishes to engage in manual work, he ordinarily takes off his coat. He works in his shirt, his outer shirt generally, or he puts on a loose fitting coat of dungaree or similar material. Now the naval uniform has reached exactly that stage for its artificers. An excellent dungaree coat (not a jumper), with roll collar and removable "U.S.Navy" buttons, and lacking only close-fitting cuffs, is already in use. But we balk at placing all of our men in this garb, first perhaps because we feel it unnecessary in the case of the special and commissary branches, and second because it too completely destroys the military and nautical conception of the Navy upon which our organization is very properly based. If then we wish to modernize the jumper and still preserve a working uniform, why not make it a shirt, which is a development along rational lines. Now a soldier on fatigue duty goes about in a shirt. He wears a modern type of trousers and a belt, and his appearance is a pleasure to the eye. He looks neat, trim, and businesslike. In the days at the beginning of our share in the World War, when, as the Paymaster General so aptly put it, there was no dearth of clothing, but a great surplus of men in the Navy, the writer was saddled with the difficulty of uniforming some hundreds of men who were detailed to guard a very valuable part of our naval property. The necessary uniform was not at hand, but it was found possible to equip the entire battalion in blue trousers, blue flannel shirts, and white hats. Leggins were worn in keeping with the strictly military character of the organization. The men also wore black belts of a uniform pattern, because the trousers were of dungaree and needed the support of the belt. We hold no brief for the dungaree of the trousers nor the color of the hats, but the ensemble—trousers, belt, shirt, and hat of a practical shape—was trim and neat to a striking degree, and won much favorable comment.

If then we are permitted to start our man-of-war's man in a modern pair of trousers, a belt to hold them up, and an outer shirt that has not the effeminate or juvenile draw string and overhang of the blouse, nor the loose-skirted slouchy set of the jumper, we are, at least, making a trim and taut beginning. Let that then be the basis of the uniform. There must be certainly a flannel or cloth outfit of this sort and one of gingham and drill or similar material to allow for differences of temperature and climate. A hat of the shape, but not the color, of the white hat could fittingly be retained, as could also the watch cap. The problem of the dress uniform suggests its own solution. We have a shirt. Finish off the uniform then with a coat. Make it double breasted, because that is associated with things nautical. The cap that goes with such a uniform is surely one with a visor. The name of the ship, if desired, could be placed as a metal device on the cap. Perhaps also a tie should be added to the shirt for dress wear.

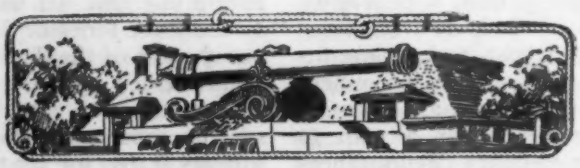
It will at once be protested that there is nothing unique in this uniform. It is only the present uniform prescribed for officers' cooks and stewards, with the most insignificant of changes. The fact is admitted. Uniqueness has not been intended. The present uniform is sufficiently unique, if that be a desirable quality. It is perhaps unfortunate that the most rational and up-to-date uniform in the service in the lower ratings should be that worn by a comparatively small class of men and should be commonly associated with that class. Nevertheless we have endeavored to arrive at our idea of what a modern man-of-war's man's uniform should essentially be by an earnest consideration of what the nature of his employment is and what modern ideas in clothing demand as a practical and rational garb, without any intentional preconceptions. Clothing may be eminently comfortable and rational without being practical. The ordinary garb of a Chinese merchant of the substantial sort, with its absence of any restricting stiffness about the neck, its loose-fitting trousers, caught in at the bottom, and free from flapping and dirt-collecting extremities is, in many essential points, a great improvement over the conventional male attire of our own particular brand of civilization. But no practical business man is going to adopt that garb at this time in this country. Yet we demand that the men of our Navy wear a uniform that is as eccentric from the standpoint of present-day attire as is the excellent Chinese garb noted above, while our Army uniform, following a process of normal evolution and adapting itself to the successive needs of military service, tempered by modern ideas of what clothing should look like, presents itself to the eye with no suggestion of the bizarre, but only as a practical and distinctive type of attire to meet the work that the soldier is called upon to do. There was a comparatively recent demand for men for recruiting duty who were not chief petty officers, the reason advanced being that the chief petty officers' uniform was not promptly recognized as belonging to naval men. The inference plainly was that the chief petty officers did not attract attention. Now the pertinent question follows: would the other type of uniform, or rather, does the other type of uniform really attract recruits or does it merely attract attention? We believe that our consistent failure to secure, during peace-time recruiting, any more than a most insignificant number of recruits over twenty-one years of age is largely due to the character of the uniform we ask men of some degree of maturity to wear. Those of us who have grown used to the uniform through years of wearing it or coming in daily contact with it are prone to forget that there are millions of our people who have a like familiarity with the style into which the uniform is cast, but recognize it only as representing something worn by small boys, or school girls of a somewhat riper age. They know, doubtless, as they know about Washington's Monument and Niagara Falls, that there are actually men who wear such clothes, but their familiar and intimate impression of the uniform is that it is essentially juvenile and feminine.

There are many fundamental difficulties in the way of a uniform board which may desire to start with a clean slate and produce, as a result of their labors, the specifications for a uniform outfit for the modern man-of-war's man. Primarily they are bound by a certain amount of tradition, in spite of any attempt they may make to set it aside. They are accustomed to the present uniform, and its oddity and eccentricity

does not strike them. There are many voices habitually and loudly raised in protest against any essential change, and these voices are heard often among some of the men who are compelled to wear the uniform, and carry much weight in consequence. That is one reason why a plebiscite, if we may use the term, among the men themselves would probably produce little result of a conclusive nature, unless it were conducted on a basis of assigning certain definite weights to the majority votes of certain classes of the men—a thing which would be hopelessly impracticable. We desire certainly one uniform. The word itself suggests unity and not variety. What might be suitable for the deck force in every respect might be very objectionable for the hospital corps. What might do for the cooks might not be adapted for the carpenters. The uniform board would therefore be confronted with the necessity of devising, if not a compromise, then, at least, a comprehensive uniform. The board would necessarily have to give due consideration to the stocks of clothing which the Bureau of Supplies and Accounts had on hand. It would be required to bear in mind that the metal locker, although cheaper than the canvas bag and capable of being adjusted to the nooks and waste corners of a ship's structure in such a way as really to occupy less useful space than the present bag jackstays, has not yet fully taken the place of the latter. Coats properly folded and visored soft caps properly stowed would certainly be capable of making their appearance in the light of day in as fresh and immaculate condition as the present "liberty blues" of the competent man-of-war's man. It would be interesting to discover what a board of intelligent merchant seamen of mature seagoing experience would report upon as the most suitable outfit for a sailor man. The writer is strongly inclined to believe we would find a pair of belted, fly-front trousers, a flannel shirt, a coat, and a close-fitting cap, probably with a visor, prominent among the items set forth as essential. It would be unnecessary for a man to wear his coat under ordinary circumstances aboard ship. If the weather were chilly, he could wear his jersey over the shirt. If the weather were warm, he could shift the flannel shirt for one of gingham or other suitable light material. Undoubtedly dungarees or similar clothing would have to be retained for certain classes of work, but it would be well to leave open for more extended discussion the question of whether blue dungarees should be universally substituted for white drill, granting the latter must go. We desire to avoid any intricate discussion of the psychology of clothes, but the impression flowing from or suggested by clothes of a certain type is inevitable, and the mind in its normally serious mood rebels at the ridiculous or the incongruous. A hospital corpsman attending the sick in dungarees, a quartermaster attending the gangway in port, a yeoman receiving the prospective recruit in one of our hot inland towns, a mess attendant serving the admiral's luncheon in West Indian waters, side boys, sentries, signalmen—all react with varying degrees of shock upon the sense of propriety of the majority, if thought of in dungarees. We could get used to it. Have we not got used to the present attire, handed down from an almost forgotten era? But for the world at large the air of incongruity would persist. There are numerous colors and shades to choose from and many of them have withstood the test of actual wear—sand gray, mouse gray, forest green, horizon blue, dove, olive drab, slate, puce. To suggest any of these or any other color or shade would resolve the present discussion into a controversy at once, which is not, at this time, desirable.

The present uniform of the man-of-war's man will pass. It is a venerable relic. It dates from before wooden ships were coppered, from the days when sailors wore earrings and pig tails, from the age of powdered wigs and buckled shoon, when our own soldiers wore pantaloons and cocked hats. It has a glorious history. It has lived through the romantic era of sail, and broadsides of smooth bores. In the future our children will thrill with delight as the Paul Jones or Bainbridge or Farragut chapter of the American Legion swings by the reviewing stand in the broad striped collars, the flat caps, and the odd trousers of those men who carried American soldiers across the sea to fight in the World War, and perhaps their thoughtful elders will remember that almost a hundred and fifty years before that time American man-of-wars' men in almost the same costume (before it had become a uniform) carried

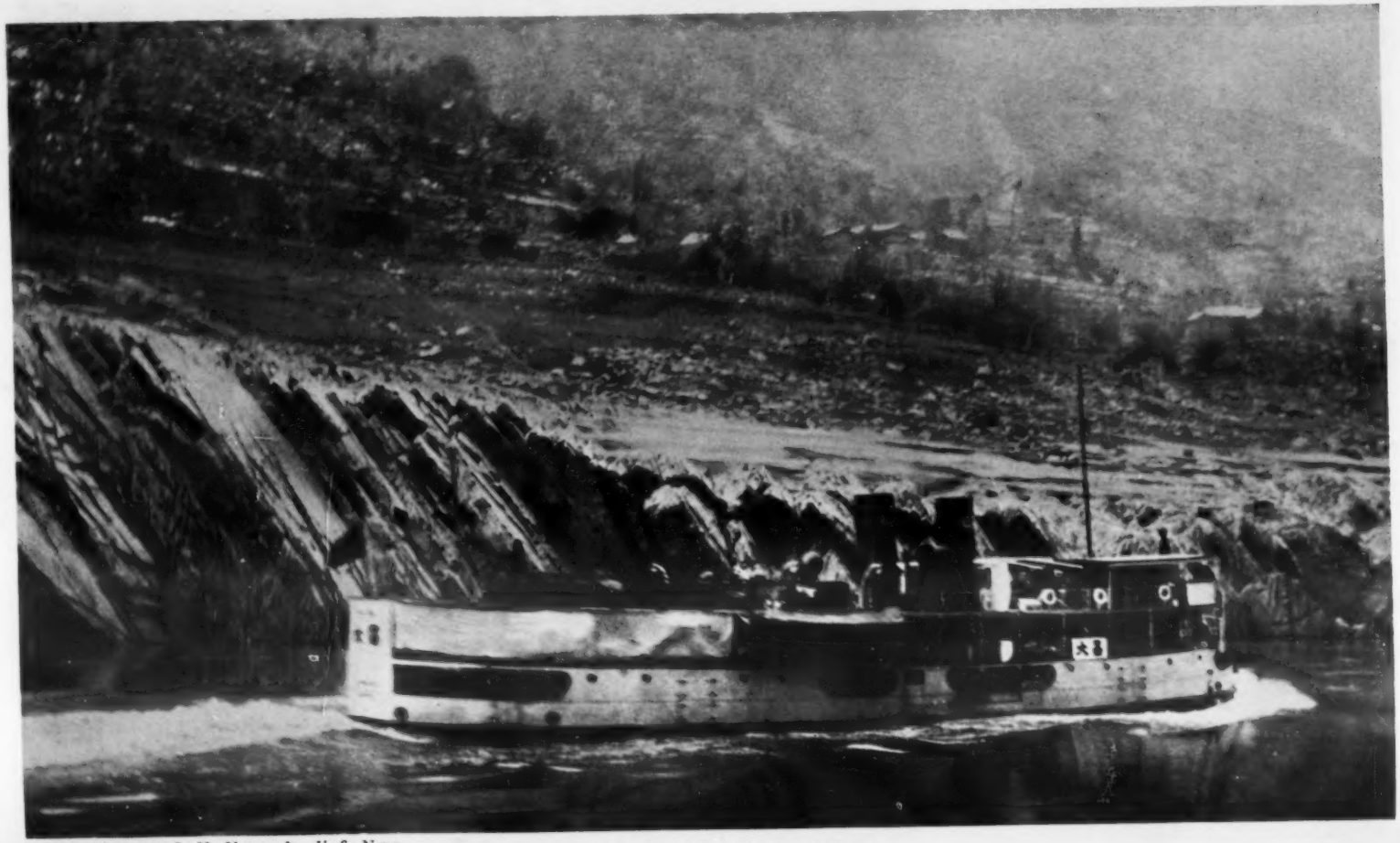
the flag of a new nation into those same waters to receive its first salute from a foreign power. So much for sentiment, but let us avoid its extreme. The men of our Navy deserve better of their country than to be garbed in obsolete attire. Their officers have long since discarded the tight-fitting breeches, the fanciful waistcoat, and the long-skirted coat of a previous century. The men themselves are irked by they know not what when compelled to mingle with their fellow humans whose undershirts do not show in public, and they are led by the very bizarreness of their attire to practice all sorts of oddities upon it and exaggerate in a heart-breaking way its already glaring eccentricities. An essential change, bringing the uniform up to date, is long overdue. It requires only the most cursory study of dress, costume, fashion, style, and uniform to arrive at a realization of their close interrelation and of the necessity for the contentment of the average mortal that his attire shall be normal to the times he is living in. Not one particle of injury will be wrought to the service by a change at this time. The sentiment that is deemed to exist for the present uniform will evaporate almost instantaneously, once a change is definitely made, just as the sentiment for the retention of the old sailing training ship passed when such training was abandoned for both midshipmen and apprentice seamen. Many of the little vexatious difficulties which we now ascribe to other sources will disappear with the whimsical garb of another and a different generation. The human race is peculiarly sensitive in its response to the clothes it wears. Dress a group of men like our Indians of a generation or so ago and they are very apt to act in a measure the way they think such Indians acted. So the young man of today, placed in the rig of a man-of-war's man of what has become to him a romantic era when all sailors were "jolly tars," shapes himself initially to that pattern of man which he considers, from his books of adventure and perhaps his observation of impossible stage sailors, the old man-of-war's man to have been. We are living in a new age. The man-of-war's man of today requires a training, an intelligence, a mental outlook, in order that he may become efficient, as different from his predecessor as that between the foot soldiers of Marlborough and the allied infantrymen of Foch. The modern line-of-battle ship resembles the glorious old three-decker about as much as the modern racing stallion resembles his three-toed progenitor. The break with the past in the Navy is, in the material sense, practically complete, except in this persistent retention of an antiquated and eccentric uniform. With tradition in the abstract we do not wish to break. We cannot revere too much nor hold too fast to the fearless courage, the dauntless determination, the supreme skill that gave us the sea victories of the Revolution and of 1812. But even as our admiration for ancient Greek art and architecture does not require us to pour out libations to the gods of the Hellenes, so let us not be blinded by the laudable desire to emulate the military virtues of our long line of naval heroes into requiring the men who man our ships to appear in a uniform which, in our present civilization, is most certainly a travesty where it is not wholly a misery.



Courtesy Lieutenant L. Y. Mason, Jr., U. S. Navy

HSINTAN RAPIDS

UNIV. OF MICH.



Courtesy Lieutenant L. Y. Mason, Jr., U. S. Navy

BETWEEN YUNYANG AND WANHSIEN

Courtesy Lieutenant L. Y. Mason, Jr., U. S. Navy

BETWEEN YUNYANG AND WANHSIEN

Courtesy Lieutenant L. Y. Mason, Jr., U. S. Navy

SS. *KIANG KING* AGROUND ABOVE YEH TAN

Courtesy Lieutenant L. Y. Mason, Jr., U. S. Navy

MARBLE BOAT SUMMER PALACE BUILT FOR EMPRESS DOWAGER IN 1888

Courtesy Lieutenant L. Y. Mason, Jr., U. S. Navy

MARBLE BOAT SUMMER PALACE BUILT FOR EMPRESS DOWAGER IN 1888

Courtesy Lieutenant L. Y. Mason, Jr., U. S. Navy

RIVER GUNBOATS AT ICHANG—*MONOCACY, OAHU, LUZON, PANAY*

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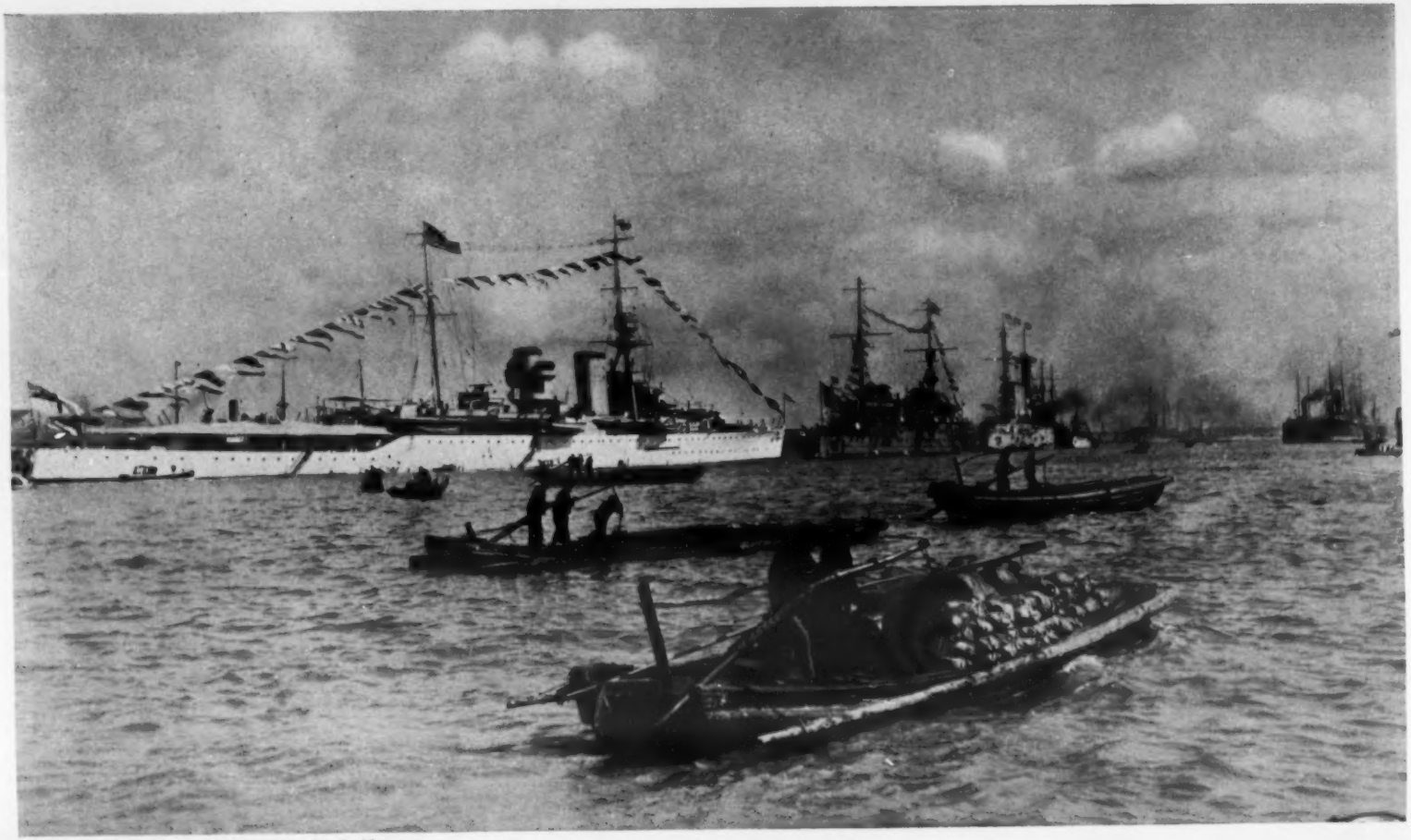


Courtesy Lieutenant L. Y. Mason, Jr., U. S. Navy

PROTECTING NATIONAL INTERESTS

Courtesy Lieutenant L. Y. Mason, Jr., U. S. Navy

CHUNGKING

UNIV OF ILLINOIS

Courtesy Lieutenant L. Y. Mason, Jr., U. S. Navy

COLONNADE, SUMMER PALACE

Staff Organization Afloat

By LIEUTENANT COMMANDER ROBERT B. CARNEY, *U. S. Navy*

AS THE procurement of men and material, the maintaining of communications, and the retention of cohesive control present a more rapidly changing aspect in land warfare than in the prosecution of a campaign afloat, staff functions seem to have received more serious attention in the land forces than in our own service. Naval command is centralized as far as peace-time operations are concerned, and for most phases of operations in war the same methods will be applicable. Actual battle will present a somewhat different problem, but even in battle the personnel of the fleet have at hand the means to subsist themselves, repair damage, care for the injured, and continue shooting and steaming—a situation entirely different from that of the battle ground of land warfare.

The great number of units operating as entities in land warfare is an additional factor leading to the continuous employment of a larger group of officers trained in staff functions than is necessary in a naval campaign. In fact, our entire system of logistics and command varies from that employed in the Army. Very little of practical value has been published on this subject for the guidance of our officers, and virtually nothing exists which might be taken as a guide for an officer about to report to his first staff assignment and anxious to familiarize himself with his new duties. That there is a need for some such reference paper is unquestionably true; this discussion has therefore been prepared with the hope of possibly assisting certain officers and perhaps evoking sufficient argument to result eventually in the preparation of a standard outline for the official guidance of the service.

FUNCTIONS COMMON TO ALL STAFFS

Regardless of the size of the staff concerned, and the specific requirements of the unit, a staff afloat has two distinct functions to perform: (a) tactical control; (b) administrative control. That is true of a fleet staff, of the staff of a subdivision of a major unit, or the staff of even the smallest detachment. The fulfillment of those functions may require many officers and a large complement of enlisted personnel, or they may be centered in the person of one officer; but they are present as the essence of control in any group or unit afloat, however large or small.

Both functions include two important but somewhat intangible types of activity, namely, purely technical work, and actual operations of the unit. This point is mentioned better to understand staff work, but the practical basis of classifying staff functions is by the five types of service every staff must render to a greater or less degree: (1) intelligence; (2) operations; (3) communications; (4) logistics (maintenance and supply); (5) personnel.

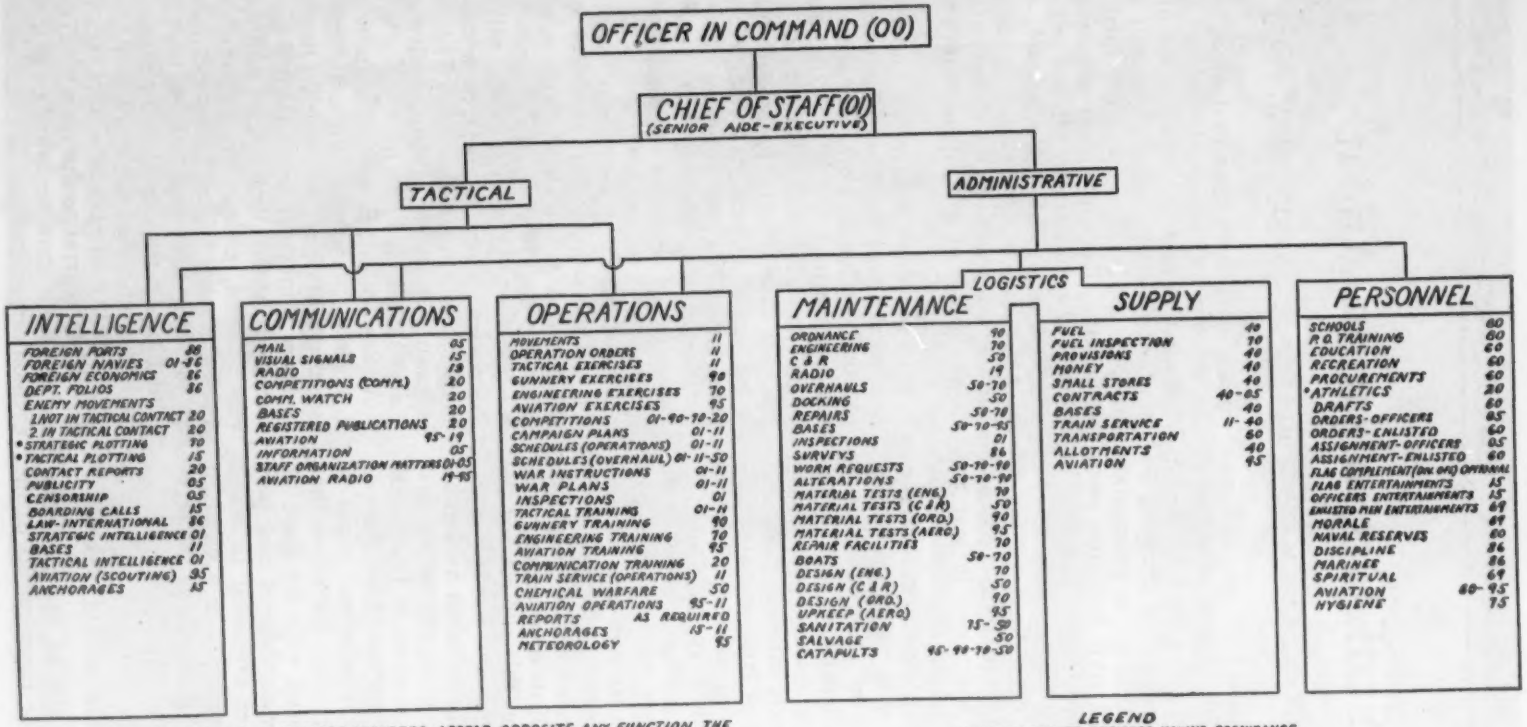
Plate I shows the division of work under the above headings. For convenience, maintenance and supply have been considered separately on the chart. The legend showing the office-of-origin numbers will enable the reader to see at a glance what officer is responsible for each item. The relation between tactical and administrative control is also shown on Plate I.

At this point it is of interest to note that it would be impossible for an officer to be assigned to one section only. Overlapping of duties is inherent in naval staff work and must be accepted; the chief of staff can prevent friction, and under harmonious conditions overlap becomes an asset by virtue of the fact that each officer understands something of the other fellow's job.

Having classified all work and indicated responsibility for each item, it is usually convenient to rearrange the plan of Plate I in some way to show separately the duties of each officer.

COLONNADE, SUMMER PALACE

Courtesy Lieutenant L. Y. Mason, Jr., U. S. Navy



NOTE: WHERE TWO OR MORE NUMBERS APPEAR OPPOSITE ANY FUNCTION THE FIRST TAKES ACTION AFTER CONSULTING OTHERS

THIS DIAGRAM SHOWS (1) THE DIVISION OF STAFF FUNCTIONS CLASSIFIED UNDER THE VARIOUS TYPES OF SERVICE, AND (2) THE ASSIGNMENT OF COGNIZANCE. ON STAFFS OF UNITS SMALLER THAN THE FLEET EACH OFFICER WILL HAVE TO PERFORM TWO OR MORE OF THE ASSIGNMENTS SHOWN IN THE LEGEND AND THE ASSIGNMENT OF COGNIZANCE WILL VARY ACCORDINGLY.

*HAS BEEN ASSIGNED ELSEWHERE DEPENDING ON THE SPECIAL QUALIFICATIONS OF VARIOUS MEMBERS OF THE STAFF

LEGEND

NUMBERS INDICATE OFFICERS HAVING COGNIZANCE

00-OFFICER IN COMMAND
01-CHIEF OF STAFF
05-FLAG SECRETARY
11-ASST CH. OF STAFF
15-FLAG LIEUTENANT
19-RADIO
20-COMMUNICATIONS
40-PAY OR SUPPLY
50-CONSTRUCTOR
60-PERSONNEL
69-CHAPLAIN
70-ENGINEER
75-SURGEON
86-MARINE
90-GUNNERY
95-AVIATION

PLATE I

Cognizance

For a small staff with relatively few duties to perform, a single-sheet chart is by far the most convenient method of summarizing cognizance, but in the case of large staffs it is necessary to resort to some pamphlet form. In any case it will become apparent that the lines of demarcation between the staff sections, as such, virtually disappear; this is conclusive proof that sharply defined staff sections are utterly impossible, and that overlap is essential. The chief of staff, assisted by the flag secretary, arranges to have all officers concerned collaborate as necessary on any particular assignment. In practice this is done by taking a letter prepared by the officer responsible, securing the comment of all other officers directly or indirectly concerned, and when agreed on by all, presenting it for signature by the officer in command or the chief of staff.

Appendix A is a sample of the finished product; it clearly shows every officer's responsibility and also assigns to some one officer definite responsibility for every question that is likely to arise. The form in which to put such a cognizance summary is optional. In the case of the staff of a small unit, many of the items listed could be omitted.

Routing

Correspondence and dispatches coming in are always handled by a certain desk, and are from there routed to the action officers. Unless the person doing that routing is perfectly familiar with the cognizance assignment, he cannot intelligently and expeditiously perform his duties; here the summary becomes of vital importance. Proper use and dissemination of the staff cognizance list is not only essential to staff work but it has been found advantageous to distribute it to all units of the command, and to the staffs of other units with which contact is continuously made.

The actual mechanics of handling mail and dispatches must be made the subject of detailed instruction for the benefit of the enlisted personnel, and the information of all staff officers, in order that they may know how business is handled. These instructions are usually issued under the head of "Office Instructions"; further comment on this subject will be found in Appendix B.

The staff functions and method of apportioning tasks having been outlined, it is time to proceed to a consideration of the two principal functions of the staff: tactical control, and administrative control.

Tactical Control

In considering tactical control, two important points must be borne in mind: (a) even while cruising, questions of administration arise and must be settled; (b) it is axiomatic that although mistakes in administration may be later corrected, tactical decisions must be made quickly and must be right the first time. It is therefore obvious that in addition to organizing to meet tactical situations, the staff must be prepared to make administrative decisions while under way. Three conditions must be considered: (1) battle; (2) cruising in vicinity of the enemy; (3) peace-time cruising.

The requirements of each of the foregoing conditions may be stated and met as follows:

Battle. (1) Maintain strategic plot; (2) maintain tactical plot; (3) carry on maneuvering plot; (4) supervise and control communications; (5) correlate the use of offensive armament with tactics; (6) record events.

The presence of the entire staff is usually required. The degree to which the above functions are expanded depends upon the unit concerned; for example, the tactical information required by the commander of a division is less than that needed by the officer in tactical command.

The strategic plot is constructed from radio reports as a rule, and may be combined with the plot of the tactical situation. A graphic presentation of the strategic situation is essential to the officer in tactical command and to the second in command.

The tactical plot is constructed from information secured by dispatch or obtained by actual sight observation of a staff officer detailed for that purpose.

The maneuvering plot is conducted on the mooring board and is absolutely necessary to swift, accurate maneuvering. Excellent discussions of the mooring board have appeared in the Proceedings.

The message center may be, and generally is, located on the bridge while under way. All rapid communications other than signals, are handled through the message cen-

SEA OPERATING STATIONS

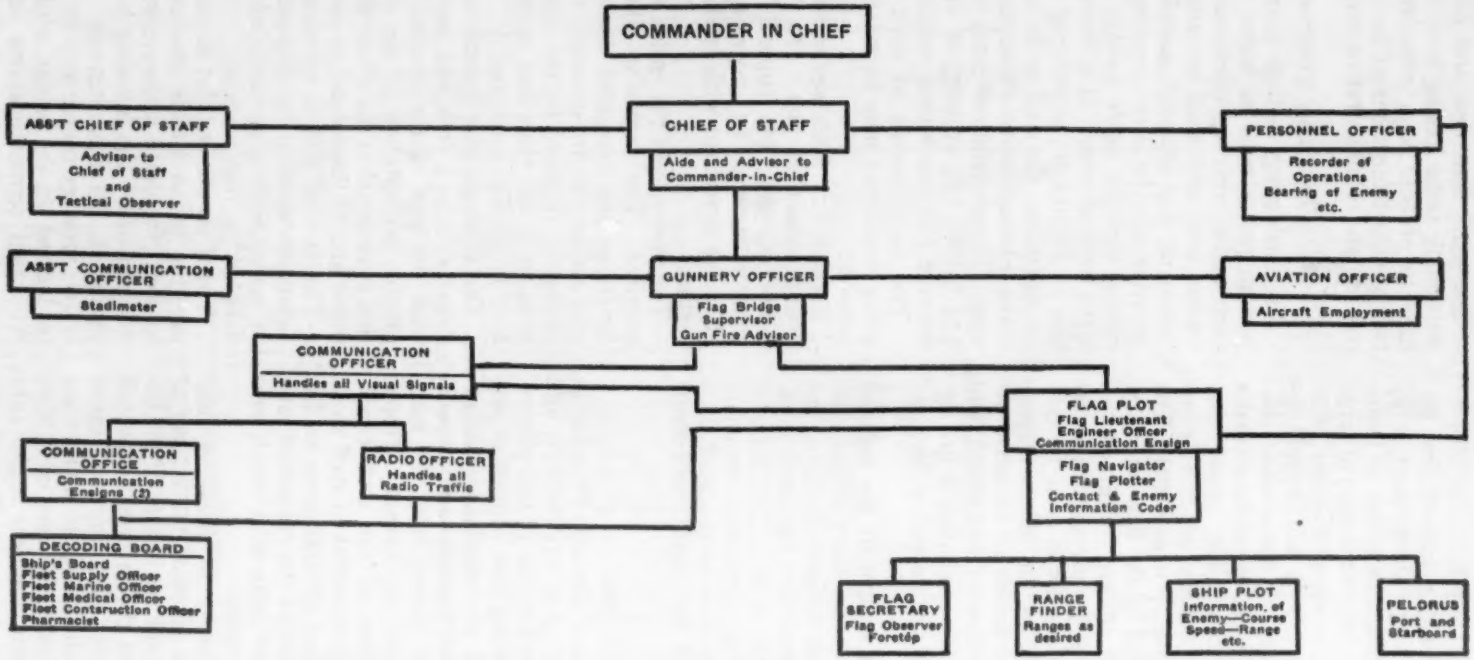


PLATE II

(An actual plan employed in a major unit)

No distinction is made in this diagram between direct flow of command and additional channels for information, due to the flexibility necessary in the bridge organization.

ter. Some one officer of the staff is in direct charge of battle communications.

The staff gunnery officer acts as adviser in the matter of correlating gunnery and tactics, and it is also sound practice to station an additional officer in such a position as to have the best possible all-around vision, for the purpose of keeping the admiral advised of all tactical developments. This latter observer may be stationed in the foretop to advantage, and he should be in direct communication with the officer running the tactical plot.

Cruising in vicinity of the enemy. This corresponds to the familiar "Condition II" and is a compromise designed to keep the staff service functioning on the bridge at best possible efficiency compatible with obtaining the rest and relaxation necessary for a prolonged campaign. Sufficient staff personnel are on the bridge at all times in this condition to properly act on any tactical emergency that may arise, and to insure maneuvering, plotting, and communication supervision all being carried on simultaneously. The composition of the watches will depend entirely upon the situation and the personnel available.

Normal peace-time cruising. Under conditions of normal cruising when no maneuvers are to be expected and there is no reason to expect that complicated conditions will arise necessitating quick and complex action by the staff, a staff watch officer may be detailed to observe generally the trend of events and carry on the routine work of the staff. The staff duty officer will carry out the admiral's orders, inform him of such events as may be necessary, keep track of the general situation, and route all incoming matter to the proper action officers. He acts on any emergency matter in accordance with his orders.

Let us now consider the question of carrying on the administrative control while under way; three conditions must be considered as in the case of tactical control: battle, cruising in the vicinity of the enemy, and normal peace-time cruising without maneuvers.

The best solution to the question of assuring that all communications reach the proper action officer lies in the detailing of a staff officer whose specific duty is to perform or supervise that function. The mission of the staff, the operation engaged in, and many other considerations enter into the selection of that officer. It may be done by rotation or it may be necessary to solve it some other way.

Before proceeding, one point must be made clear: in practically all organizations, both staff and ship, there are certain junior officers specially trained in radio and visual procedure, who actually put the transmission headings on all outgoing dispatches and personally receive and indicate the interior routing for all incoming dispatches. These officers are called the communication watch officers, and their station while on watch is known as the communication desk. The writer has operated the communication desk with highly trained enlisted men, but whether officers or enlisted men are used, the work of the communication desk must be supervised by one of the regular staff. In the following subparagraphs it will be understood that the communication watch officer actually indicates the routing of dispatches before they come to the attention of the staff communication officer or the staff duty officer.

Battle. Communication officer visés all dispatches, and uses his judgment as to whether they should be held until after the action, or sent to the action officer at once.

Cruising in vicinity of enemy. Communication watch officer routes dispatches in the normal way and furnishes the senior staff officer on watch with a copy in order that he may check up if necessary on the priority of action.

Normal peace-time cruising with no maneuvers. Handled in the same manner as above, except that the staff duty officer gets the copy and is responsible for seeing that action is taken by the proper officer if of an urgent nature. In the last two above, the staff watch may act if it is apparent that action must be taken immediately and that no time can be allowed for routine action.

On small staffs where there is no communication watch officer to assign routine routing, the staff officer on watch may be called upon to perform that function, but the principle involved is the same, and may be expressed by saying that ***business never ceases.*** In a subsequent part of this paper will be taken up the mechanics of handling, routing, filing, and check-up of dispatches.

Plate II shows the functions performed by the staff in battle.

Messages received or transmitted in code are encoded and decoded by the decoding board which is connected with the communication desk and the radio receiving and transmitting rooms by telephone, voice tubes, and pneumatic tube. The decoding board is usually composed of staff corps officers who have no other function in battle. The whole board may be called upon to act, or may be divided up into watches to meet the situation.

Administrative Control

A study of Plate I will reveal the fact that a detail of staff officers to purely technical or administrative work or to any of the staff sections without overlap or duplication is absolutely impossible; any attempt to do so would be narrow, limiting, and altogether undesirable. Overlap and dovetailing are possible of accomplishment without friction or duplication of effort. Elimination of friction is the function of the chief of staff or senior aide, and the flag secretary by careful inspection of all outgoing correspondence can, with the aid of the communication officer, prevent the issue of duplicate or conflicting orders or instructions. The flag secretary of necessity sees all correspondence, and the rapid communications are supervised by the communication officer; furthermore, copies of dispatches are delivered to the flag secretary in order that he may scan them with a view toward filing them with pertinent correspondence. With such a central clearing-house method of handling *all* communications, duplication and confusion is reduced to a minimum. In order to further reduce chance of error it is good practice to restrict the authority to sign orders or instructions; letters not signed by the officers in command or the chief of staff should be signed "by direction" by one special officer and no other; this eliminates the possibility of any staff officer going off independently on a tack not in accordance with policy.

It is believed that Plate I is self-explanatory in regard to the work handled by various members of the staff. The mechanics of the assignment of work and its subsequent handling is briefly as follows:

(a) All incoming mail is read by the flag secretary and assigned to the proper officers for action, following the organization chart or pamphlet as a guide. A suitable follow-up system should be employed to prevent possible pigeonholing of mail.

(b) Dispatches are routed at the communication desk in much the same manner as mail, copies being retained for the follow-up file, and for the flag secretary, who must check them against any mail communications that may be on file dealing with the same subject.

(c) Action officers consult with the chief of staff or the admiral as necessary in preparing the required orders, letters, indorsements, etc.

(d) All staff officers send outgoing mail through the flag secretary, on whom rests the burden of checking it against existing orders and policies to prevent discrepancies.

(e) Flag secretary obtains necessary signatures and is responsible for proper mailing, distribution, acknowledgment, tracers, and other matters incident to efficient checking and follow-up.

(f) The absence of any staff officer does not cause cessation of business; each staff officer has a duly appointed relief. Ordinarily it would be advisable to await the return of the action officer, but when prompt action is essential, the understudy will act. The staff officer with the day's duty may be called upon to make decisions and for that reason all staff officers must keep in touch with all the activities of the staff in a general way.

Several points in connection with the organization chart should be considered; an understanding of the questions involved will be of assistance in organizing any staff or getting a new staff into its swing, but it must be borne in mind that although basic principles must be met, they may, however, be obscure and their solutions may differ widely where the composition of the staffs vary.

(a) Differentiation between technical staff and administrative staff is vague; they are functions rather than actual assignments to duty or responsibility.

(b) Two or more officers may have functions under the same staff section, and one officer may have responsibilities in more than one staff section.

(c) Intelligence, operations, and communications are directly joined up in any staff; they are the backbone of battle tactical organization—the duty to which all other considerations and activities must be subordinated.

(d) Operations being the ultimate aim, all other staff sections are inseparably bound to operations in one way or another; this will be seen from an inspection of the chart and from a consideration of the chief aim of all our work—preparation for battle.

The representation of aviation on staffs presents a problem somewhat different from any other activity. On fleet staffs the aviation aide acts in an advisory capacity only, and is a definite part of the staff organization with the designation of aide. In certain other units he is not an aide in the strictest sense of the work, but is an attaché of the staff charged with the duty of advising the unit commander in aviation matters, and at the same time holding a command status in connection with the planes attached to the unit. His command status is usually tactical only—that is, he commands in the air—but the administrative command of individual planes and their personnel rests with the commanding officers of the ships to which they are attached. The situation appears ambiguous but is the only solution so far devised. Plane operations are so peculiarly technical that orders for plane activities must be prepared by the flight aide or adviser, but in order that any proposed air operations will be in accord with scheduled surface operations, all operation orders for planes should have the release and approval of the operations section of the staff before being issued. This principle applies to instructions regarding aviation material as well as operations. The reasons for this will be apparent when it is considered that plane launching, flight, recovery, and servicing will undoubtedly affect surface units and must therefore not conflict with any other scheduled operations.

Composition of the Staff

The matter of selecting a staff may not hold much interest for some, but I believe it sheds light on the relation of staffs to other service activities and therefore properly belongs here. Right here let me say that the assignment of duties will always to some extent have to be arranged to fit the characteristics of the personnel available; background and experience cannot be created by executive order. In selecting a staff it has been the policy in the past to pick officers who have specialized in technical subjects, with a result that staffs carry experts in gunnery, engineering, naval construction, medicine, law, radio, communications, etc. The underlying principle is, of course, that of furnishing the admiral with a corps of advisers who, among them, are *au courant* with the details of all technical military subjects.

In the composition of a fleet staff, or for that matter any staff, there would, however, seem to be another factor well worth considering and practicing beyond the limits to which now carried. I refer to familiarity with the several types of ships and the various shore activities. Certain of the bureaus have recognized this need, with a result that the Bureaus of Engineering, Medicine and Surgery, Construction and Repair, Supplies and Accounts, and Marine Corps Headquarters usually suggest to a prospective fleet commander the names of officers of their corps who should be acceptable and who would be of value in that they are familiar with the policies of their respective bureaus. The Bureau of Navigation is the most recent to subscribe to this idea and now keeps on each fleet staff an officer recently attached to the bureau and familiar with personnel matters. That this principle is correct is demonstrated every day in practice, but it is believed that it should be extended, and it can be extended without in the least hampering the admiral in the selection of his staff. On the staff of any officer commanding several types of ships, and dealing with navy yards and districts, there should be officers familiar in general with those types of ships and the several shore activities. It will require no little care in the selection of the staff to combine all these classes of training and experience, but it is possible of accomplishment. To take the most expanded example, let us consider the staff of a fleet commander; on it should be officers capable by training of performing the following duties: operations (orders, reports, movements, etc.), gunnery, engineer, flag secretary, flag lieutenant, radio, communications, aviation, construction, personnel administration, supply, medical, chaplain, marine (marine corps matters and law).

In addition to the above functions, some officer of the staff should by virtue of past duty be thoroughly familiar in a general way with the following: battleships, cruisers, destroyers, submarines, carriers, mine

layers, tenders and repair ships, navy yard organization, district organization, Naval War College, Navy Department organization, Army coast-defense plans.

Naturally, as many officers as possible should be familiar with the latter list, and all of the technical aides should understand the workings and policies of the bureaus having cognizance over the subjects in which they are specialists; but it is essential that each item of the above lists be covered by at least one officer if the admiral is to have available the best advice on any subject that may arise. It is understood that the chief of staff will coordinate all staff activities, both internal and in relation to other units, and by his understanding of the admiral's policies, and his long years of experience, provide the necessary balance to all recommendations emanating from staff officers.

Practical Pointers on Staff Work

Records. In administrating any unit, however large or small, there are certain records, ticklers, and summaries that are indispensable in properly keeping track of all the activities of that unit. For the commander in chief or the senior officer present of a heterogeneous force, such helps are doubly important. The following list will serve to illustrate: "ships present" list for port or area; approved general employment schedule for the fleet; unit employment schedules; prospective movement list; brief summary of concurrent shore activities, functions, etc.; "pending" file of dispatches on which action is not complete; tickler for bringing attention to matters on which action is required on a certain date or at a certain time; communication chart or list; calendar of daily events of all ships concerned; employment chart.

The employment chart referred to above is one of the most important adjuncts to proper staff work; its exact type depends upon the size and composition of the unit concerned. One such as shown in Plate III would be applicable to a battleship division; for other units or forces, obvious changes would be necessary, but Plate III clearly sets forth the idea. Entries on the employment chart should be made whenever any event is ordered or scheduled, every communication being carefully scanned in the light of possible future employment. Suitable entries should be made on the chart, and the file or reference num-

EMPLOYMENT FOR MONTH OF ---------19 ---

BATTLESHIP DIVISION - FOUR

DATE	NEW MEXICO												MISSISSIPPI												IDAHO												CALIFORNIA ASSIGNED FOR GUNNERY AND TACTICAL TRAINING											
	Underway	At Anchor	Gunnery Exercise	Tactics	Full Power	Inspection	Fuel	Provision	Landing Force	Liberty-Athletics	Overhaul	Miscellaneous	Underway	At Anchor	Gunnery Exercise	Tactics	Full Power	Inspection	Fuel	Provision	Landing Force	Liberty-Athletics	Overhaul	Miscellaneous	Underway	At Anchor	Gunnery Exercise	Tactics	Full Power	Inspection	Fuel	Provision	Landing Force	Liberty-Athletics	Overhaul	Miscellaneous	Underway	At Anchor	Gunnery Exercise	Tactics	Full Power	Inspection	Fuel	Provision	Landing Force	Liberty-Athletics	Overhaul	Miscellaneous
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LEGEND: F = Fires T = Tows O = Observes R = Rehearse P = Practice Runs E = En Route

PLATE III

bers should be noted for future ready reference. Such a system precludes the possibility of forgetting scheduled operations.

Communications. Authority exists for detailing a staff communication officer, and the Department requires the establishment of a staff communication section, either as a separate section or as a part of the operations section. Occasional misunderstanding has arisen due to a misinterpretation of the word "communications"; properly speaking "communications" applies to all means of imparting information, instructions, or orders, and embraces mail, radio, visual, and verbal transmission, whether for the transmitting of such orders externally or within the ship. Under this comprehensive definition of "communications" it would seem that the communication officer would be in charge of both mail and rapid communications; however, such an assignment is more than one man can handle in detail where a large volume of business is transacted. It therefore becomes necessary to make separate assignments to take care of mail and rapid communications; there are two ways in which this situation may be met: (a) have the flag secretary supervise *all* communications, personally taking charge of mail, and assisted by an officer specially entrusted with rapid communications; or (b) have the communication officer in charge of *all* communications, with assistants as may be necessary for mail and rapid communications.

Either system will work, and the adoption of one or the other will depend largely upon the officers available for duty on the staff in question. In either system the actual mechanics of radio and visual transmission is the responsibility of the radio officer and flag lieutenant respectively. In both systems the mail and rapid communications must be closely coördinated in order that all types of communications pertaining to any particular subject will be filed and recorded together. The writer favors the system outlined under (a) above because it is the one with which he is most familiar, and also because it does not necessitate the reading of mail by more than one person to insure all matters reaching the proper action officers.

Personnel. On staffs where no special personnel officer is allowed, the problem of properly administrating both commissioned and enlisted personnel requires the greatest attention on the part of the officer acting in that capacity. Personnel administration is a subject of the utmost importance; some of the duties of the personnel officer are listed for information: assignments of drafts; maintaining detailed records of personnel by ships (rates only); trade-school details; allocation of special ratings; assignment of special details outside the unit; familiarity with laws and regulations regarding compensation on patrol and other temporary duty; determining qualifications for transfers; training of petty officers; obtaining material for special schools; following up procurement of personnel; transportation of personnel; keeping track of movements of ships available for transportation; issuing personnel memoranda; checking vacancy reports.

From the most casual inspection of the foregoing list it will be apparent that the greatest attention to detail is necessary; there is no royal road to accomplishment in the personnel officer's job, and all records, ticklers, etc., must be kept up to the minute.

Staff specialists. It is not necessary here to go into the responsibilities of the specialists on the staff; their duties are enumerated in Appendix A.

Finance and supply. One apparently ambiguous condition exists in the fleet in connection with supply; the fleet supply officer is not attached to the fleet staff but is a member of the staff of the base force. This peculiarity will be understood when it is considered that the base force is charged with attending to matters of fleet logistics. Do not confuse the fleet paymaster with the fleet supply officer; the former is charged with finance matters only and is a member of the staff of the fleet commander. Lack of space precludes a more detailed discussion on this point, but it should not entirely escape attention.

Correspondence. Space requirements also make it impossible to discuss all the types of letters and orders that are handled by staffs but it may prove of assistance to list some of the more common items passing through staff offices: *orders* for patrol, provisioning, fueling, athletic events, gunnery practices, engineering performances, communication drills, R/C exercises, tactical exercises, anchorage assignments, transfers of enlisted personnel, officers' orders, trans-

fers to temporary duty, employment schedules, aircraft exercises, operation orders, landing force, ship movements, fleet mail distribution, small-arms practices, Naval Reserve matters; *letters* on granting allotment, action on work requests, indorsements in general, multiple-addressed letters; also *Navy Regulations* on honors, correspondence, duties of flag and commanding officers, precepts of all kinds, inspection reports, and dispatches on every possible subject. Staff officers must be familiar with dispatch writing, communication instructions, anchorage assignments, confidential and secret publication list, fleet organization, customs and pratique matters, uniform regulations, and tactical publications.

The foregoing will serve as a starter; further discussion might prove discouraging rather than helpful.

The appendices and charts are intended to give concrete information illustrative of the abstract discussion of staff functions.

APPENDIX A

Summary of Cognizance

Note: This may be greatly condensed for units smaller than a fleet.

The officer in command outlines policies in harmony with those issued by the Navy Department and his immediate superior in command, for the maintenance, operation, and progressive development of the unit. He prescribes in general terms how these policies shall be executed. He will be kept informed of all important matters and of all operations of the unit.

The executive (chief of staff) is responsible for carrying out all details of command and administration in accordance with the general policies of the officer in command. He is responsible for keeping the officer in command informed of all important events and problems that arise, and for consulting with him concerning matters of policy. All questions which reach the officer in command for decision or action should first pass through the chief of staff.

The duties of the staff are indicated in this summary.

Reliefs are provided for all officers in the event of their absence as indicated below (numbers are reference numbers used on dispatches and letters to indicate officer preparing order, indorsement, etc.):

Duty	Relief
11. Ass't Chief of Staff	90. Gunnery Officer
05. Flag Secretary	20. Communication Officer
	60. Personnel Officer
15. Flag Lieutenant	20. Communication Officer
19. Radio Officer	— Ship's Radio Officer
20. Communication Officer	05. Flag Secretary
40. Paymaster	— Duty Officer
50. Constructor	70. Engineer Officer
60. Personnel Officer	05. Flag Secretary
69. Chaplain	
70. Engineer Officer	50. Constructor
75. Surgeon	— Duty Officer
86. Marine	— As desired
90. Gunnery Officer	05. Flag Secretary
95. Aviation Aide	05. Flag Secretary

Chief of Staff (01)

(a) Advises the officer in command on all matters concerning battle efficiency.

(b) Prepares campaign plans and outlines orders for their execution.

(c) Prepares comprehensive plans for the development of tactics.

(d) Outlines strategical and tactical problems.

(e) Submits criticisms to officer in command on orders and solutions submitted by juniors, and also comments on the execution of orders by subordinates.

(f) Prepares programs for progressive development in all branches.

(g) Submits recommendations concerning fleet, war plans, War Instructions, and additions to and transfers from the fleet.

(h) Prepares outlines of employment schedules.

(i) Signs correspondence as follows: routine matters not involving questions of new policy, and not involving approval or disapproval of a previous recommendation by a flag officer, or action on legal papers all of which will be signed by the officer in command; matters concerning which the policy of the officer in command is known; requests for repairs and alterations; letters from the Department quoted for compliance or guidance; action on leave requests (except flag officers); orders to officers; circular or multiple-addressed letters not requiring the signature of the officer in command.

(j) Exercises general supervision over all staff work and coördinates all staff activities.

Assistant Chief of Staff (11). Operations Officer.

(a) Acts as assistant to the chief of staff in the discharge of his duties as required.
(b) Recommends vessels for special duty.
(c) Submits recommendations for operations and movements of vessels and prepares movement orders.
(d) Head of the board which prepares employment, overhaul, and docking schedules upon outlines prescribed by the chief of staff.
(e) Prepares strategical and tactical problems, campaign orders, and operation orders upon outlines prescribed by the chief of staff.
(f) Makes recommendations concerning logistics.
(g) Makes recommendations concerning proposed changes in regulations (unit).
(h) Prepares reports of unit activities of tactical or general character.
(i) Has cognizance of bases.
(j) Verifies movement reports.
(k) Prepares monthly readiness report.
(l) Is custodian of war plans and letters pertaining thereto.
(m) Signs correspondence in absence of chief of staff.

Flag Secretary (05)

(a) In charge of office personnel.
(b) In charge of personnel and administration of print shop.
(c) Authenticates multiple-addressed letters.
(d) Assigns incoming matters for action.
(e) Ascertains that outgoing communications are in agreement with regulations, policies, employment schedules, and correspondence instructions, and are properly distributed.
(f) Brings to attention of officers all conflicting, inconsistent, or overdue communications.
(g) Supervises the issue of all communications of a circular or generally applicable nature.
(h) Is responsible for general dissemination of information within the staff.
(i) Is responsible for U.S. and guard-mail matters.
(j) Is responsible for administering flag allotment.
(k) Officers' orders and leave requests other than flag and commanding officers.
(l) Signs "by direction" as ordered by the officer in command.
(m) Tactical and strategical observer.
(n) News letters.
(o) Publicity and censorship.

Flag Lieutenant (15)

(a) Personal aide to officer in command.
(b) Signal officer.
(c) In charge of ceremonies, orchestra, entertainments, boats, club privileges, boarding calls, uniform, etc.
(d) Patrol.*
(e) Inspection reports.*
(f) Flag plotter.*
(g) Flag navigator.
(h) Anchorages.
(i) Has charge of visual signaling and visual signal equipment.

Radio Officer (19)

(a) Radio and sound installations.
(b) Methods of radio communication.
(c) Training radio personnel.
(d) Relations with shore radio stations.
(e) Supervises radio on flagship.
(f) Radio discrepancy reports.
(g) Radio competitions; collaborates with 20.
(h) Recommends assignments of frequencies.
(i) Assignment of radio personnel.

Communication Watch Officers (18)

(a) Stand communication watches.
(b) Must be familiar with communication instructions, codes, and staff procedure and organization.
(c) Communication watch officers are usually assigned as assistants to members of the staff for certain special duties, in addition to their regular watch duty.

Communication Officer (20)

(a) Rapid communication service.
(b) Communication procedure.
(c) Supervises communication watch officers.
(d) Assistant tactical officer.
(e) Movement reports.

* These duties may be assigned to some other officer.

(f) Confidential publications.
(g) Communication competitions.
(h) Athletics (this may be assigned elsewhere).

Gunnery Officer (90)

(a) Supervises gunnery training, exercises, and the care and upkeep of armament of the unit.
(b) Prepares outlines of schedules for gunnery exercises.
(c) Member of schedule board of staff.
(d) Prepares questions used in military inspections to determine offensive and defensive qualities of ships.
(e) Supervises small-arms training and exercises.
(f) Collaborates with aviation officer in connection with aviation gunnery.
(g) In charge of the following matters, consulting with assistant chief of staff regarding tactical aspects: mining and sweeping exercises and material; torpedoes and torpedo practices; smoke screens, offensive and defensive; all ordnance and gunnery matters.
(h) Gunnery schools—coöperates with personnel officer.
(i) Liaison officer with Army in gunnery and ordnance matters.
(j) Rifle matches.
(k) Tactical officer (under way).
(l) Collaborates with 70 and 95 on questions concerning catapults.

Engineer Officer (70)

(a) Supervises training and performances in engineering matters and keeps posted on state of efficiency in unit.
(b) Prepares outlines of schedules of engineering exercises.
(c) Member of staff schedule board.
(d) In charge of all matters relative to: alterations, preservation and repair (engineering); engineering tests and experiments; design and construction of machinery; quality and use of fuel—specifications; material inspections; machinery of ships' boats; engineering subjects not specially mentioned; repair facilities.
(e) Material readiness reports in collaboration with 50 and 90.
(f) Navigational equipment.
(g) Material readiness of ships—collaborates with 50.
(h) Repair officer.
(i) Records of fuel expended.

Personnel Officer (60)

(a) In charge of matters relating to ships' complements, enlistments, transfers, discharges, liberty, shore boats, leave (enlisted men).
(b) Prepares indorsements on leave requests from men.
(c) Exercises supervision of training and instruction of enlisted personnel.
(d) In charge of entertainments of enlisted personnel ashore and afloat.
(e) Educational officer.
(f) Moving pictures.
(g) Transportation—all personnel.
(h) Historian of all exercises.
(i) Naval Reserve matters.

The paymaster, supply officer, surgeon, and chaplain have duties varying somewhat on different staffs and it is not considered necessary or advisable to tabulate them here.

Constructor (50)

(a) Prepares data for docking.
(b) In charge of all matters relating to alterations, preservation and repairs (hull), seaworthiness, tests and experiments under cognizance of Bureau of C&R, design of ships, buildings, and facilities, material inspections (hull), chemical warfare service.
(c) Salvage operations.

Marine Officer (86)

(a) Intelligence officer.
(b) Marine Corps matters.
(c) Courts and boards, appointments, promotions.
(d) Civil and military law.
(e) Matters of discipline.
(f) Court-martial orders.
(g) Landing force training and exercises.
(h) Rifle ranges.
(i) International law.

Aviation Officer (95)

(a) Advises with reference to: aircraft operations; aviation matters regarding policy pertaining to material, personnel, gunnery, radio; coördination of aviation activities of the unit; aircraft employment; development of aircraft tactics and doctrine.
(b) Keeps informed of effectiveness and state of training of aircraft.
(c) Member of staff schedule board.

(d) Prepares analyses and reports of aircraft exercises.
(e) Meteorology.
(f) Consults with operations officer before releasing orders affecting operations of aircraft.

Staff Duty Officer (14)

(a) Receives routine reports.
(b) Acts on routine matters.
(c) Acts for absentee officers when assigned relief is also absent.
(d) Attends side in absence of flag lieutenant.
(e) Regulates movements of staff boats.
(f) Keeps posted on what officers are aboard or absent.
(g) Makes boarding calls on visiting foreign men-of-war.

The communication watch officer may relieve the duty officer in cases of emergency where the duty officer must temporarily leave the ship, as in (g) above.

APPENDIX B

Office Instructions

Every staff has in effect a set of office instructions set forth in greater or less degree of detail. Lack of space prevents a complete discussion of office management, but the salient points enumerated below should serve as an outline for further study.

1. The flag office handles all written staff communications.

2. The flag dispatch office (or desk) handles all rapid communications to and from both flag and ship.

3. The following publications must be kept up to date and must be thoroughly understood by office personnel: Navy Regulations, Communication Instructions, Fleet Regulations, Unit Regulations (if any), Staff Instructions, various bureau manuals.

4. General instructions must be issued covering day's duty, duties of the office force, assignment of office personnel, watch, quarter, and station bill of flag complement.

5. The flag secretary and yeomen concerned must be indoctrinated in (a) method of handling incoming mail; (b) method of handling outgoing mail; (c) preparing correspondence as per regulations; (d) order forms; (e) tracer systems, internal and external; (f) filing system, and classification of correspondence; (g) printing; (h) routing.

6. With regard to dispatches, the communication watch officer, orderlies, and communication yeomen must have clear instructions covering communication watches, code and cipher work, message files, discrepancies, handling of messages incoming and outgoing, acknowledgments, release of messages, signals, degrees of priority, delivery of messages to staff officers, and filing of dispatches.

7. One officer must be specially detailed in charge of registered publications; instructions issued by the Registered Publication Section (Operations) fully cover this officer's duties.

8. The following additional items should be covered in the office instructions: (a) interior communications; (b) cleaning details; (c) liberty cards; (d) uniform; (e) U. S. and guard mail; (f) print shop; (g) distribution of letters; (h) calendar of reports periodically due; (i) employment records and sheets.

All staffs in actual operation will have instructions covering the various points cited above; before a new staff begins to function copies of the office instructions of one of the larger staffs should be obtained for the information of all concerned. It is regretted that this subject cannot be treated more fully here, but office management afloat is in itself a lengthy and complicated subject.

Pattern Sizes *in* Formation Bombing

By COMMANDER GARRET L. SCHUYLER, *U. S. Navy*

IN STUDYING the theory of formation bombing, one soon faces questions of the best number of planes to use in the bombing group, how far apart it is best to fly them, and whether or not it is best to endeavor to have them spaced equidistantly. But unfortunately all textbooks seem strangely silent on these new problems.

The more complete theory for irregular targets which are variously presented can be built up later. But to simplify the treatment, let us here consider the target as having only one dimension, such as range, for example. Call T the target size, p the pattern size, S the average M.P.I. error, and P the probability of hits; T, p, and S all being measured along the same axis.

We must study how T, p, S, and P are related. But in order to avoid dealing with quite so many variables, let us eliminate one of them by expressing the pattern size and the average M.P.I. error in terms of the size of the target. Then we need only determine P, the probability of hits, as a function of (p/T) and (S/T).

In a series of two salvos, assume that the pattern and the target are of equal size, and that one of the two patterns lies exactly on the target while the other pattern is two target lengths away. The *average* M.P.I. error is one target's size. A single pattern as large as the target would, when located at that distance from the target, make no hits at all. But this series of two salvos obviously will make 50 per cent hits.

It is apparent, therefore, in computing hits for an *average* M.P.I. error (S/T), that we cannot deal simply with that average value so as to compute the average probability in a single simple operation. Instead, we must deal individually with some large number of equally probable values of the M.P.I. error, and then average the resulting series of percentages of hits.

In the following work, forty approximately equally probable values of the M.P.I. error (twenty on each side of the target's center) were used in every computation. These M.P.I. errors were found by multiplying (S/T) by the ratios which, in the ordinary probability tables, correspond to probabilities of 0.025, 0.075, 0.125....0.975.

In the figure the curves drawn as full lines show the probabilities of hits for patterns in which bombs are equidistantly spaced, or spaced so as to make the "density" uniform throughout the pattern. The curves drawn in dashes show the probabilities of hits for patterns in which the "density" tapers steadily from zero at the ends to a maximum in the center. And the curves drawn in dots show the probabilities of at least *some* parts of the patterns (of whichever type) falling on the target.[1]

The curves are instructive in showing that some improvement in hitting is always obtainable by spacing the bombs in the pattern so that the "density" steadily increases from zero at the ends to a maximum in the center. This gain is hardly of importance, however, except when patterns are larger than, and when the average M.P.I. errors are smaller than, the size of the target. So unless we are making well over 30 per cent hits with patterns larger than the target, there seems no real point in attempting to vary the "density" in the different parts of the pattern even if (as seems not to be the case) we could arrange to do it.[2]

As the curves all slope downward on the right, there is, with the same average M.P.I. error, invariably some improvement in hits

[1] In strict theory a uniform pattern of a finite number of bombs must overlap the target a finite amount to make a hit; and a tapered density pattern must overlap it even slightly more. But investigation shows the omission of these effects exercises only a negligible influence on what follows.

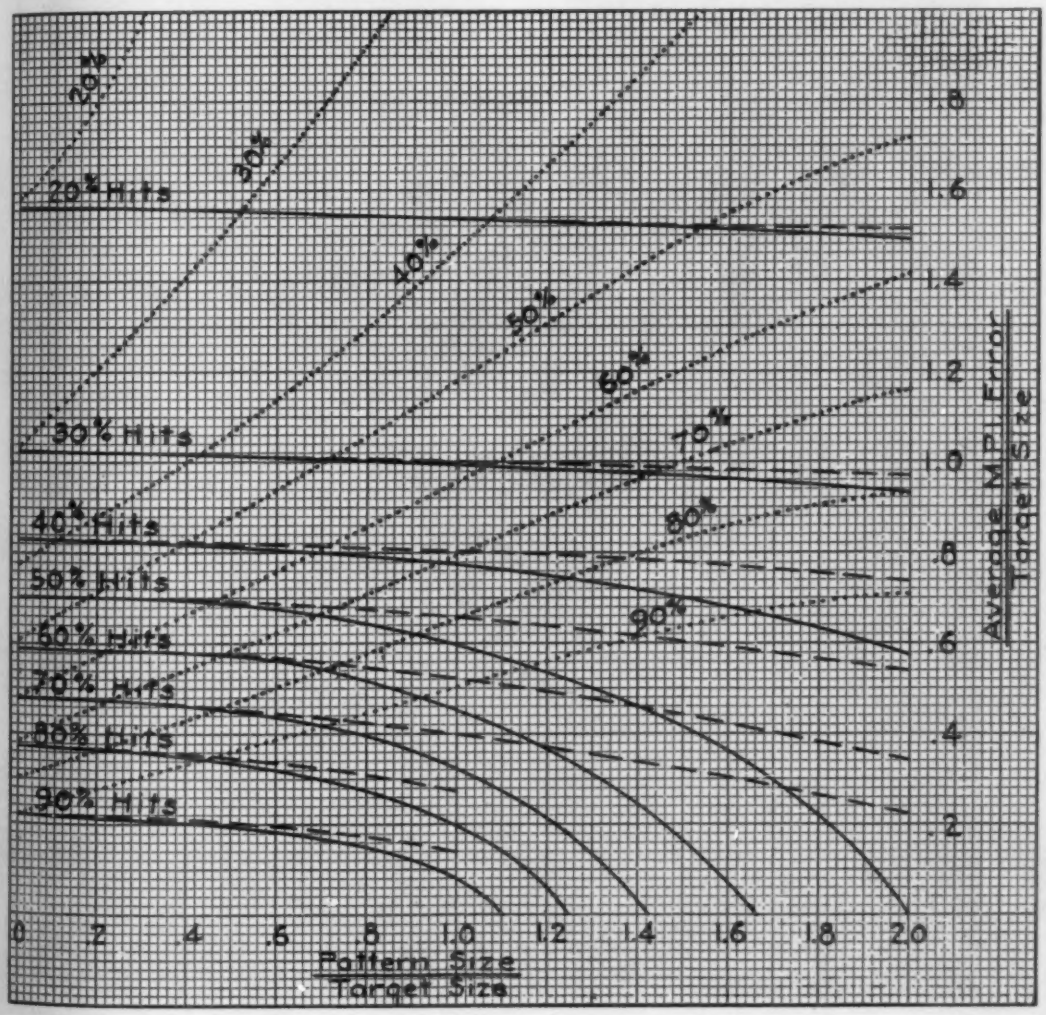
[2] Tapered density patterns, however, would not seem at all difficult to have a torpedo fire where "spreads" are used.

obtainable by the use of a smaller pattern. The amount of improvement so effected seems, however, to be considerably less than is generally imagined; and this small improvement in hits is obtainable only at the expense of completely missing the target considerably more frequently than one would with larger patterns.

For example, consider bombing in which about 30 per cent hits are made; or assume an average M.P.I. error just as large as the target. We get 31 per cent, 30 per cent and 29 per cent hits, respectively, with patterns 0, 1, and 2 times the size of the target. But these patterns, respectively, will make *some* hits in 31 per cent, 57 per cent and 77 per cent of the attacks.

"Dependability," or the probability of making at least *some* hits on any one attack, is a factor opposed to the making of quite the largest number of hits in the long run. But though it is a factor difficult to weigh numerically against the average percentage of hits which we make, it surely is something that cannot be completely overlooked.

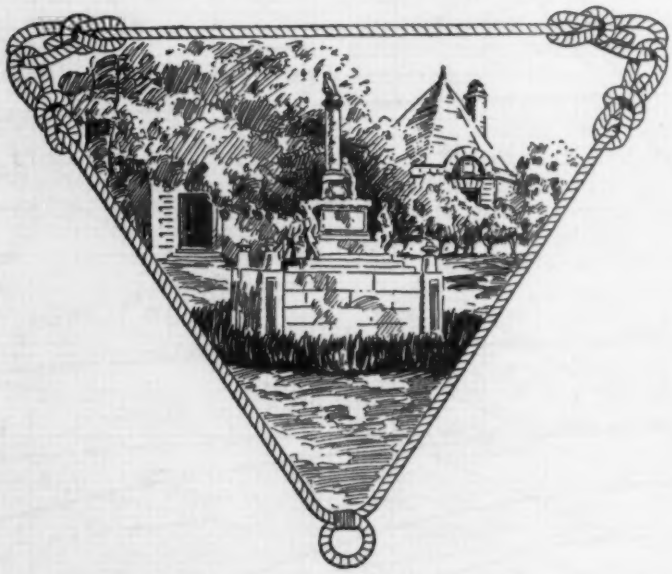
For example, suppose in practical formation bombing that the bomb sight gives an average M.P.I. error as large as the target and that we are able, if we will, to make the pattern only half as large as the target. Would it not then be sounder doctrine to make the pattern twice as large as the target, so sacrificing only about one-thirtieth of the final percentage of hits in order to be able to count on making some hits each



time in 77 per cent of the attacks instead of in only 44 per cent of them?

Personally we think there cannot be the slighest doubt that, under such conditions, it would be desirable to use the larger rather than the smaller of these two pattern sizes. Invariably working for the smallest possible pattern size simply "because it will give most hits," seems disposing of a very complex problem in an extremely incomplete and superficial fashion. The figure will show those who are evolving doctrines for formation bombing exactly how much in the way of greater "dependability" is often obtainable by sacrificing only a certain very small percentage of hits.[8] Without dogmatizing further we, therefore, can safely leave it to these curves to tell their own story.

[8] Making the pattern as much as three times the M.P.I. error seems an outside limit beyond which we should never consider extending the process.



By Ewing Galloway, New York

WARWICK PARISH, BERMUDA

Close-up of Khyber Pass about fifty feet deep. Two vehicles could not pass.

By Burton Holmes from Ewing Galloway

BERMUDA—LOOKING TOWARD SPITHEAD, WITH HAMILTON, THE CAPITAL, BEYOND

BERMUDA—LOOKING TOWARD SPITHEAD, WITH HAMILTON, THE CAPITAL, BEYOND

By Burton Holmes from Ewing Galloway

A BERMUDA CISTERN
This cistern is typical of many on the island.

UNIV. OF MICH.

By Ewing Galloway, New York

PEMBROKE PARISH, BERMUDA
This is Queen Street from the front of the American House.

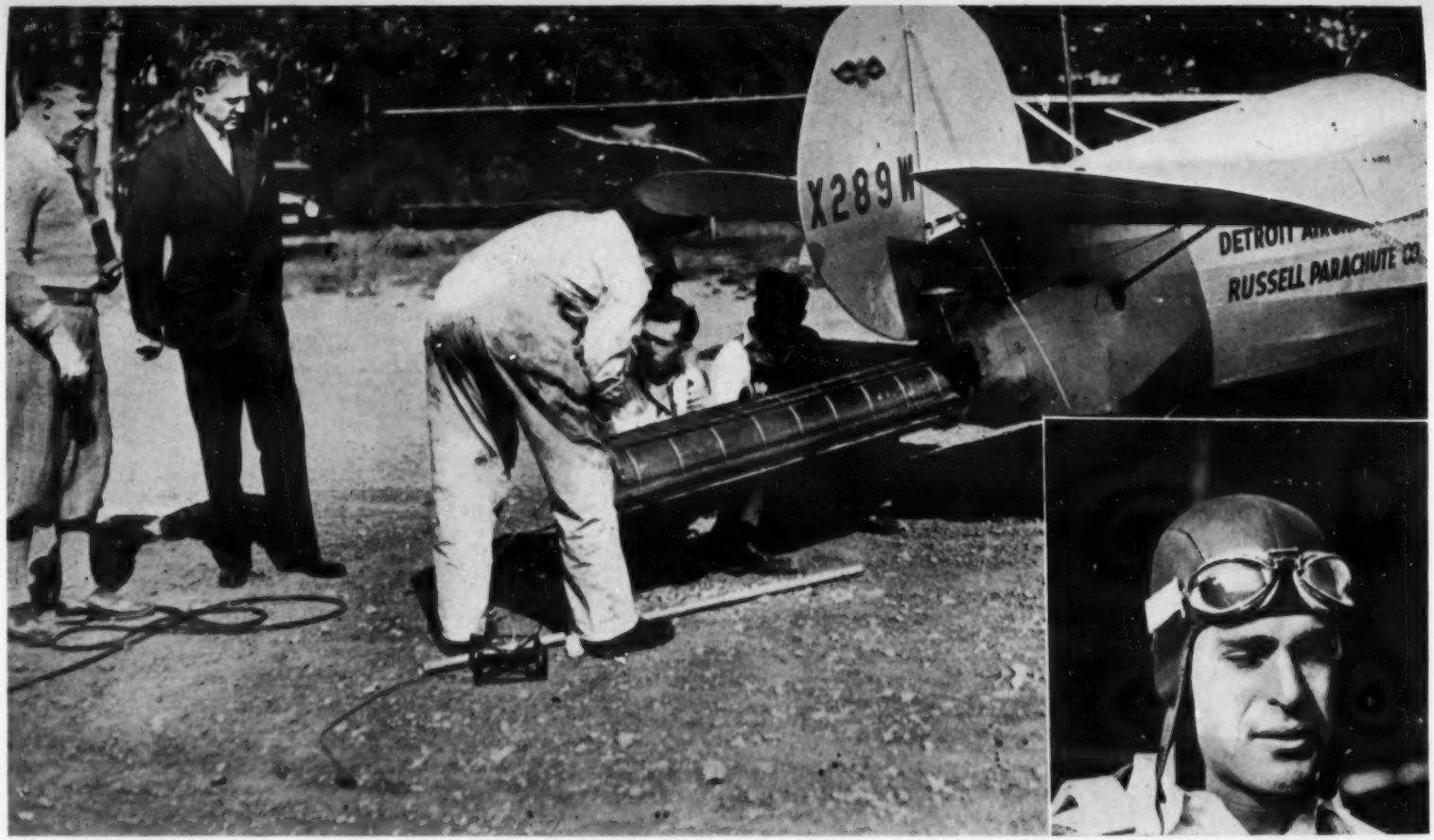
By Burton Holmes from Ewing Galloway

AN OLD BUILDING, BERMUDA

UNIV. OF MICH.

By Burton Holmes from Ewing Galloway

CEDARS ON THE SEASHORE AT BERMUDA

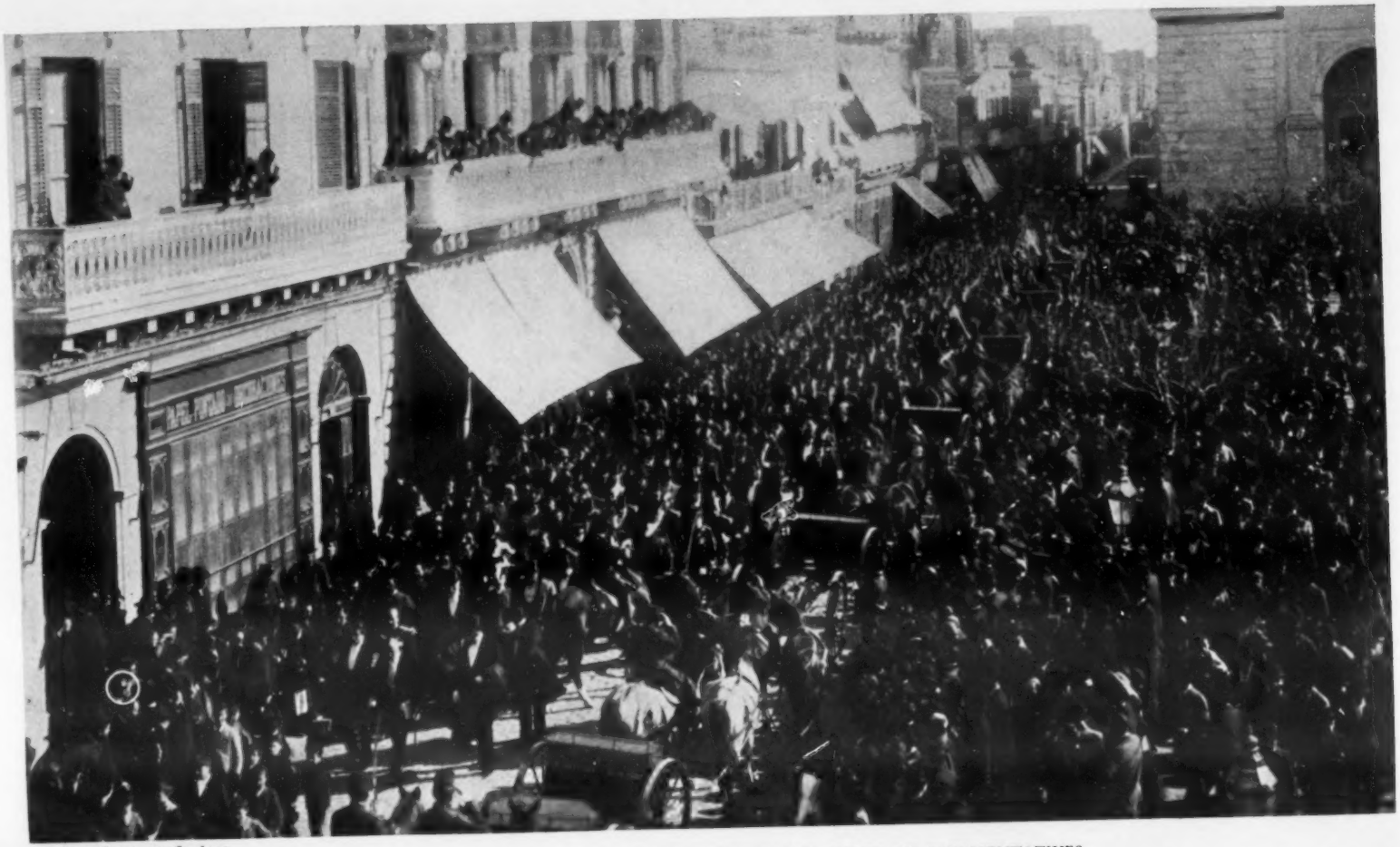


International News

PILOT AND PLANE TO BE USED IN NEW-TYPE PARACHUTE

The parachute was tested recently in Detroit and gave indications that a definite step toward reduction of accidents has been made. At the left the folded up parachute is shown being loaded into the torpedo-like tube in the tail of the plane. When the pilot gets into trouble, he jerks the controls, throws the ship into a spin, and out comes the parachute, and, if the invention is a success, the plane floats safely to earth. (See page 115).

UNIV. OF MICH.

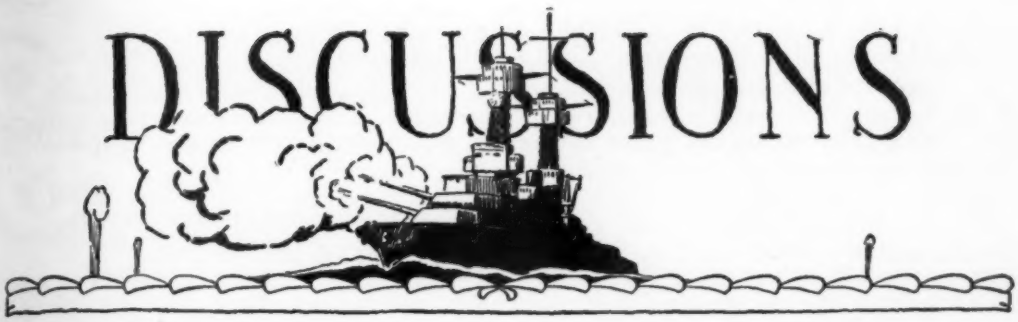


Courtesy Constance Lathrop

PRESIDENT BORDA AND OFFICIALS APPROACHING THE HOUSE OF REPRESENTATIVES

Photographed about half a second before the President was shot. The assassin is shown standing near the doorway to the left. (See "U.S.S. *Lancaster* Observes a Revolution," November, 1930, issue of the PROCEEDINGS, and Secretary's Notes of this issue).

DISCUSSIONS



Photographed about half a second before the President was shot. The assassin is shown standing near the doorway to the left. (See "Observes a Revolution," November, 1930, issue of the PROCEEDINGS, and Secretary's Notes of this issue).

The New Competition

(See page 792, September, 1930, PROCEEDINGS)

LIEUTENANT CARL J. LAMB, *U. S. Naval Reserve.*—Lieutenant Casey has written well on the above subject and shows by his presentation the excellent benefit resulting from the postgraduate work in engineering.

We believe that Lieutenant Casey has confused bare engine weights when he mentions seventeen pounds per s.hp. for the *Ersatz Preussen* installation, with total machinery weights.

With respect to the figure of 750 degrees Fahrenheit temperature mentioned by Lieutenant Casey, there are several installations of land turbines which have been running successfully for some time with steam temperatures of 850 degrees Fahrenheit at the throttle, although a temperature of over 750 degrees Fahrenheit is not advised for marine practice.

While it is true that our Navy has been rather slow in going to higher steam pressures and temperatures, and that there are quite a few merchant ships and foreign naval vessels using considerably higher steam pressures with superheats running around 200 to 250 degrees Fahrenheit, it should be borne in mind that the larger gains in efficiency are due to increased temperatures to a much greater extent than they are due to pressures. Also, when pressures go above 400 pounds, the weight curves begin to turn upward, and reheat is almost obligatory.

Lieutenant Casey has overlooked a most important item in his article, and one which holds hope of great improvement. Too little consideration has been given in the past, to improving efficiency and reducing weights of the important engine- and fireroom auxiliaries. Fortunately, a considerable amount of experimental and development work has recently produced designs of propeller type blowers, scoops, air ejectors, propeller pumps, and auxiliary turbines which give great promise of improved efficiency and reduced weights, and these are rapidly being adopted by the Navy.

As is indicated in the article, the subject matter mentioned is concerned more with the future, and is certainly constructive. It is safe to say, however, that the Bureau of Engineering is entirely alive to the situation, and will be found taking advantage of all developed improvements for greater efficiency and reduced weights as soon as they are beyond the experimental stage, and can be obtained from reputable builders. With our Navy limited as it is by treaty, however, first consideration must be given to reliability now, more than in the past.

It should be mentioned in passing that the *Ersatz Preussen* is not really the forerunner of a new or startling type of naval vessel. This honor belongs to the Swedish ships *Drottning Victoria* and *Gustave V* propelled by geared turbines which have been in very successful operation since 1921 and 1922, respectively.

The Spherant

(See page 607, July, 1930, PROCEEDINGS)

LIEUTENANT COMMANDER P. V. H. WEEMS, *U. S. Navy.*—The excellent article by Ensign Kaster on his novel and interesting invention, the spherant, is the incentive for analyzing data obtained on the U.S.S. *Cuyama.* The use of a second-setting navigation watch set to local apparent time greatly simplified the work since the local hour angle to the exact second (for the middle equation of time) was read directly from the watch.

The ship was practically stationary, though there was a perceptible motion. The position was accurately known. With

the local hour angle and the geographical position of the observer accurately known, the amount the observed spherant readings differed from the known values of local hour angle, or of the latitude, gave at once the combined personal and instrumental errors.

The instrument was somewhat difficult to use, as this was the first time the writer had operated a spherant. After a short time, however, the observations were made without any great difficulty. It will be noted that on the first series, most of the observations were made a few seconds after the time set; this being due to slowness in making the proper coincidence.

Since these observations were made, the spherant has been further improved, as explained by Ensign Kaster in a letter to the writer:

Considerable progress has been made since I saw you last, which according to my notes was on 25 September, 1929.

Although we obtained some results on board the *Cuyama*, the instrument failed to "get by" at San Diego. It was too difficult to observe with. In the following months I redesigned the optical system entirely so that fields are completely visible in all positions of the instrument or the eye. I

SPHERANT OBSERVATIONS OF SUN

U.S.S. *Cuyama*—San Pedro Harbor, Lat. 33°-43′N, Long. 118°-15′ W.
Date: Afternoon September 25, 1929. Declination 0°-56′S, Eq. Time 8^m-23^s(−).

Number	L. H. A. true	Latitude by spherant	Error	Remarks
	h m s	° ′	′	
1	2-24-00	33-40	3 S	
2	26-00	50	7 N	
3	28-00	30	13 S	
4	30-00	25	18 S	Taken 30 sec. too soon.
5	30-00	41	2 S	
6	31-00	36	7 S	
7	32-00	36	6 S	
8	33-00	30	13 S	Taken 30 sec. too late
9	34-00	22	21 S	
10	35-00	35	8 S	
Average error 9.8′; mean error 8.4 S.				
11	2-48-00	34-15	33 N	Taken 2 min. late
12	52-00	33-47	4 N	Taken late
13	56-00	45	2 N	Taken 20 sec. late
14	58-00	35	8 S	Taken 20 sec. late
15	3-00-00	30	13 S	Taken 15 sec. early
16	1-00	34	9 S	Taken 2 min. late
17	4-00	40	3 S	
18	7-00	47	4 N	Taken 1 min. 20 sec. late
19	10-00	41	2 S	
20	12-00	43	0	
Mean latitude 33-43.8 N; average error 7.8′; mean error 0.8′N.				

		L.H.A. by spherant	Error	Arc	Longitude
21	3-14-33	3-14-24	9 E	2′	118-17 W
22	15-20	14-44	36 W	9	24
23	16-00	15-48	12 W	3	18
24	16-40	16-48	8 E	2	13
25	17-40	17-12	28 W	7	22
26	18-10	18-16	6 E	1.5	13.5
27	18-55	19-00	5 E	1	14
28	19-37	19-30	7 W	2	17
29	20-13	20-22	9 E	2	13
30	20-44	20-32	12 W	3	18
Average error in longitude 3.3′; average error in time 13 secs.; mean error in longitude 2′W.					

hope you will be interested in testing the new arrangement when you are again in this vicinity.

When it was taken to the Naval Air Station in its present shape the former objections disappeared. Reports sent to Washington resulted in the Navy Department ordering several which are now under construction.

If the new model is any improvement over the one used on the *Cuyama,* the instrument should already be developed to the stage where it is of practical use.

Ensign Kaster brings out in a clear way several points of interest to persons interested in celestial navigation. For instance, the point he makes about taking bubble sextant observations when a ship is at the middle of the roll, is an important observation. It is the accumulated information such as this derived from original sources which renders the greatest benefit to navigation.

Number	L.H.A. true	L.H.A. by spherant	Error time	Error arc	Longitude
			Secs.	′	
31	3–24–11	3–24–24	13 E	3	118–12 W
32	26–57	26–28	29 W	7	22
33	28–26	28–28	2 E	0.5	15.5
34	40–34	40–20	14 W	3.5	18.5
35	41–20	41–12	8 W	2	17
36	42–56	42–36	20 W	5	20
37	44–11	44–04	7 W	2	17
38	45–07	45–00	7 W	2	17
39	46–39	46–28	11 W	3	18
40	47–00	46–52	8 W	2	17
Average error in time 12 secs.; average error in longitude 3′; mean error in longitude 2.3′W					
41	3–48–21	3–48–20	1 W	0	118–15
42	42–10	48–56	14 W	3.5	18.5
43	50–02	49–52	10 W	2.5	17.5
44	51–56	52–04	8 E	2	13
45	54–10	54–00	10 W	2.5	17.5
46	57–22	57–10	12 W	3	18
47	58–52	58–24	28 W	7	22
48	59–50	59–24	26 W	6.5	21.5
Average error in time 13′.6 secs.; average error in longitude 3′.4; mean error in longitude 2′.9W					

Number	True L.H.A	Assumed L.H.A.	L.H.A. by spherant	Latitude by spherant	Error latitude	Error longitude	
						Secs.	Arc
49	3–02–00		3–01–44			16 W	4′
50		3–04–00		33–39	*4S		
51		3–06–00		33–43	0		
52	3–08–15		3–08–00			15 W	4

NOTE: Observations No. 49 and No. 50 form a point on the line of position, as do observations No. 51 and No. 52.

Average error in longitude 4′ W; average error in latitude 2′ S.

NOTE: No allowance was made for errors due to refraction, or for errors due to taking observation before or after time (L.H.A.) set on the spherant. If these corrections were applied, the average errors would be reduced by a small amount.

Ballistic Engineering Problems: Empirical Summaries.

(See page 850, September, 1930, PROCEEDINGS)

LOUIS THOMPSON.—The discussion by Mr. Williams in the September PROCEEDINGS, with respect to expansion of gun tubes, includes a misinterpretation of the statement of reference in the paper. Transient strain and radial enlargement of the tube by virtue of greatly enhanced pressure, not temperature, is the basis for the argument. This may be inferred from the sentences immediately preceding and following the one quoted. The time interval during which this condition prevails is short, of the order .01 to .02 second, and heat transfer is

not a very important factor in effecting changes in bore dimension within the interval.

U. S. Submarines in the War Zone

(See page 711, August, 1930, Proceedings)

Lieutenant Commander H. E. Keisker, *U. S. Naval Reserve.*—One reads with interest the well-written article on "U. S. Submarines in the War Zone," by Lieutenant Cope. He has singled out interesting experiences, but with a lack of accuracy for which, perhaps, he is not to be blamed. It is to be regretted that the inaccuracies crept in especially after the very complete, detailed, and accurate account of "American Submarine Operations in the War," by Professor Carroll S. Alden, which was printed in serial form beginning in June 1920. This latter account, derived from the war diaries of the individual boats and published undoubtedly under permission of the Department (being so soon after the close of the war), is not only accurate, but most complete in detail. Lieutenant Cope's information must have been obtained from reading (perhaps even Professor Alden's narrative), or from yarns oft told and hence lacking in accuracy of detail because dimmed in memory after ten or more years. A few of these inaccuracies are cited here, not because they represent glaring deviations from the truth, but because they give false impressions; and it is felt that any information published in the Proceedings which is either incorrect or misleading should not go unchallenged. To wit: "Of the eight K-boats that had been overhauled for duty in the war zone, only four, the *K-1, K-2, K-5,* and *K-6* managed to get as far as the Azores." The four boats named were completing a regular overhaul when the shelling of Ponta Delgada in the Azores, by a German submarine, gave birth to the idea of an American naval base at that port, and they, as the boats most immediately available, were chosen for the post. Realizing their limited value for patrol operations due to fixed periscopes, unreliable machinery, and poor living conditions, it was never intended that they go beyond the Azores. Yet Lieutenant Cope writes, "When they finally managed to limp into the port of Ponta Delgada, Azores, on October 27, 1917, they were unable to proceed any farther, and carried on what patrols they could in that vicinity." His reference to Ensign Homer L. Ingram might be misleading and could easily give a false impression regarding that capable young officer. Ensign Ingram carried on through the winter, taking his regular turn on patrol, working at our base and inspiring all hands by his never failing cheerfulness and good nature. He, like several others, suffered an attack of grippe during the winter, after which he apparently did not fully recover, and on March 7, 1918, fully five months after arriving in the Azores, it was decided to return him to the states for other duty. A period of observation in the hospital in Brooklyn was followed by his return to duty in the Navy Department, where he served until late in the summer of 1918. He then contracted flu, which developed into pneumonia, and died in the Naval Hospital in Washington, early in September. To write that "he was sent home on sick leave, a mere shadow of the former 200-pound captain of a Navy crew and a football end . . . . soon after his return he breathed his last" is stretching the facts a bit far to emphasize the strenuosity of life in the K-boats!

Lieutenant Cope, in writing of the L-boats says, "Although they had their full share of adventures with the enemy and also our own men-of-war, none of them managed to bag a German submarine. . . . . The *L-2,* commanded by Lieutenant E. A. Logan, also had a contact with a German submarine, but in a most peculiar way. It was only by the merest luck that the American submarine was not blown out of the water. On July 10, 1918, the *L-2* was en route to Bantry Bay on the surface." Lieutenant Logan was relieved of command of the *L-2* on May 19, 1918, by Lieutenant P. F. Foster, who was in command on the date of the incident described. As a result, he was officially accredited by the British Admiralty with the destruction of the *UB-65* and for that service was decorated by our government. So that our boats *did* bag at least one German to the everlasting credit of our submarine service.

The Merchant Marine Reserve Versus the U. S. Fleet Reserve

(See page 803, September, 1930, Proceedings)

Lieutenant G. F. Forster, *U. S. Naval Reserve.*—The article touches upon a sub-

ject with which the author appears to be familiar only in part. He is certainly correct in that the "fleet personnel in a national emergency" must be augmented by a body of trained men. It is not clear from his article what he means by the term "fleet personnel." Does he mean U. S. Navy personnel or does he mean U. S. Naval Reserve, class F-1? However, it is probably true that both the regular Navy and its closest affiliate, the class F-1 of the naval reserve, would need additional personnel in time of a national emergency.

The naval reserve, as reorganized in 1925, is probably the equal of any foreign naval reserve organization. It is not necessary that we look abroad for inspiration in the planning of our naval reserve. The naval reserve has made steady progress in all lines of naval endeavor and according to the Bureau of Navigation bulletin of September 15, 1930, "the bureau notes with pleasure the favorable comments from commanding officers afloat and from officers of the reserve on the successful training cruises which have been conducted this summer."

There is little doubt that the reason for the great advance in the naval efficiency of the fleet reserve is the retainer pay paid the personnel. This enables those directing its activities to insist on high standards rather than to thank the personnel for any effort made, however ineffectual.

Commander Katterfield recommends transferring all men out of the fleet reserve who are other than ex-Navy men. As men of the fleet reserve are almost entirely other than ex-Navy this would completely break up the splendid organizations that have been built up by the combined efforts of the Navy Department and the states. These are already more highly trained in gunnery than any merchant marine reserve could hope to be in many years and in most cases they are superior in seamanship, navigation, and steam engineering as well. Moreover, their discipline approaches Navy standards which can hardly be said for any merchant marine organization except a certain few of our better established merchant lines.

In short, the U. S. Naval Reserve today, both as to officers and enlisted personnel, is far superior to the Naval Militia of prewar days and bears little or no resemblance to the mythical organization with which an effort is made to compare the merchant marine reserve. A large proportion of the officers are U. S. Naval Academy graduates, and many came up from the regular Navy personnel or were commissioned from civil life after a thorough examination. To keep them constantly in a high degree of professional attainment, they cruise many weekends on Eagle boats and also take fifteen days' active training not on an "obsolete gunboat" as suggested by Commander Katterfield, but on a modern destroyer such as they would be called on to man in case of a national emergency.

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October 1 to November 1

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Lieutenant Commander D. C. Ramsey, U. S. Navy

and

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UNITED STATES

The Naval Ammunition Depot at Hawthorne, Nevada

Army Ordnance, October.—On the western plains of Nevada, near the barren site of a deserted gold rush town, the Navy is completing construction of its newest "naval station." Here on a desert, 1,000 miles from the Pacific coast, a "town" known as the Naval Ammunition Depot, Hawthorne, Nevada, will be commissioned by the Navy.

The Hawthorne reservation occupies 180 square miles of barren land, situated halfway between Reno and Goldfield. The reservation is on a gently sloping plain, 4,500 feet above sea level, bordered on the west by high mountains and on the north by Walker Lake, which is a remnant of a prehistoric inland sea. The nearest railroad line, prior to the building of the "town," was about five and one-half miles away.

Construction was formally started July 24, 1928. A water supply was brought in from the mountains to the westward, where a 10,000,000-gallon reservoir has been constructed. Railroad tracks were laid to the site, highways built, electrical and steam systems established. High explosive magazines have been built, and, at some distance away, permanent quarters for the naval and civilian personnel who will inhabit the new town have been erected.

The project at Hawthorne has involved the construction of 145 permanent buildings, including high explosive magazines, mine-handling buildings, a laundry, a central heating and boiler plant, administration buildings, residences and barracks, a hospital, a schoolhouse, an auditorium, and a fire engine-house, together with repair shops, storehouse and refrigerating plant.

The work includes 8 miles of railroads, 24 miles of highways, 15 miles of fencing, 35,000 square yards of paving and sidewalks, a complete water supply system with 10,000,000-gallon reservoir, a distributing reservoir and 10 miles of piping, and complete sewage disposal systems, underground steam and electrical systems, recreational facilities, and extensive landscaping.

The residences and school are of brick, while the other buildings in the administration and industrial area, located about a mile from the south end of Walker Lake, are of concrete and artificial stone. The magazines are located in groups of seven. They are of the "igloo" type, partly below ground. The spacing of the magazines in each group and the distance between adjacent groups is sufficiently great to minimize the danger of "sympathetic" detonation of adjacent magazines in the event of an explosion of one magazine in a group, and to prevent the destruction of one group from affecting adjacent groups.

The Navy sought this site near Hawthorne for the storage of explosives in a region where the unfavorable conditions for human habitation and agricultural development would afford necessary isolation.

At the termination of the World War, the Navy was faced with the problem of storing a huge supply of munitions which was on hand or in transit to France. This vast quantity of ammunition, mines, depth charges, and other explosives was stored temporarily in the existing depots, through force of necessity, although it was recognized that the overcrowding of the ammunition depots was undesirable from the standpoint of explosion hazard.

The disaster at the Naval Ammunition Depot, Lake Denmark, New Jersey, in July, 1926, emphasized the necessity of providing adequate and properly protected storage facilities for this great volume of ordnance material, and for the safe peace-time storage of war reserves of ammunition.

A board of Navy officers was appointed to study this problem and to formulate a definite policy with regard to ammunition storage standards. After an exhaustive investigation of the question, this board recommended that a naval ammunition depot be established to serve the Pacific coast, to be located within 1,000 miles of the coast, to be so situated as to have convenient railroad connections to the Los Angeles-San Diego area, the San Francisco Bay region and the Columbia River-Puget Sound area, and to be placed either on government-owned or cheap barren land covering an area of at least 100 square miles.

In pursuance of this recommendation, naval experts inspected and investigated a number of sites in California, Utah and Nevada, and recommended that the depot be located near Hawthorne, Nevada, on a tract of 180 square miles of barren land, mostly government-owned, which was available practically without cost.

Excellent railroad connections to San Francisco and the Pacific Northwest already existed within comparatively easy reach, and the connection to Los Angeles, while of narrow gauge in part, eventually could be improved as a standard railroad.

Climatic and meteorological conditions were excellent, rainfall averaging less than three inches a year. The soil was well-drained and firm, and ample supplies of sand and gravel were available.

Walker Lake, 25 miles long and 8 miles wide, was near at hand and, having no outlet, offered excellent possibilities for the recreational facilities which are requisite for the maintenance of morale in this isolated spot. The town of Hawthorne, formerly a busy mining center, but in recent years almost deserted, lay within the limits of the reservation but was not a part of it, while Thorne, where the branch lines to the station joined the Southern Pacific Railroad, was about five and one-half miles away. Reno, the largest city of Nevada, lay 150 miles to the northward.

The project for the ammunition depot was authorized on May 29, 1928, at a total cost not to exceed $3,500,000, and on July 24, 1928, the work was formally started by the Honorable Fred Balzer, Governor of Nevada, in the presence of over 4,000 visitors, including many prominent citizens and several high ranking naval officers. Lieutenant Commander Carl H. Cotter, Civil Engineer Corps, United States Navy, who had been ordered as officer in charge of construction, began active work immediately in the development of plans for the station.

Topographic surveys were completed by the Geological Survey Division of the Department of the Interior on September 11, 1928, and by December 15, 1929, negotiations for the purchase of the private tracts needed for the reservation were completed.

Contracts for the railroads, highways, and electric transmission lines were awarded in rapid succession, and were followed by the contract for the main buildings and water supply system. Numerous other contracts were let as rapidly as plans could be prepared, the total awards to date being approximately $2,900,000. The principal items yet to be done include the Cat Creek dam, the mine-filling plant, and the landscaping and general improvements of grounds.

It is anticipated that the station will be ready for occupancy by September 30, 1930, and that transfer of ordnance material will be undertaken immediately. When completed, this modern scientifically designed ammunition storage depot, it is said, will be the safest plant of its kind in existence, and will be a vital factor and an invaluable adjunct in connection with the national defense in the Pacific area.

New Submarine Organization

The New York *Times*, October 18.—The reassignment of the submarine units of the United States fleet, so as to bring the underwater arm of the Navy into harmony with the London naval treaty, has been completed and, under the plan approved by Secretary Adams, all submarines, submarine tenders, and rescue vessels are now grouped under a single command, commander of the control force of the fleet.

Under the new program, Division 3, comprising five of the "S" boats, will be based on Coco Solo; Division 4, of seven "S" boats, on Honolulu; Division 9, of nine "R" boats, at New London; Division 11, of six "S" boats, also at Honolulu; Division 18, of four "S" boats, at Coco Solo; Division 19, of six "S" boats, at Honolulu, and Division 20, of six "V" boats, at San Diego.

Big Plane Carrier Ordered for Navy

The New York *Times*, October 17.—The contract for building the Navy's new $19,000,000 aircraft carrier, the first since the Washington naval limitation conference of 1921-22, was let today to the Newport News Shipbuilding and Dry Dock Company. The vessel, now known as No. 4, will be the first carrier in the Navy designed from the keel up for aircraft work in the fleet. The *Saratoga* and the *Lexington* were designed as battle cruisers and, under the provisions of the Washington naval limitation treaty were converted into aircraft carriers.

The London treaty allows 135,000 tons of aircraft carriers to each the United States and Great Britain. The completion of the ship contracted for today will bring the American tonnage to 79,800, leaving 55,200 tons for future construction at any time within the time limit of the treaty which expires December 31, 1936.

The carrier *Langley* is not included in the treaty total, since that vessel is of the experimental type.

Assistant Secretary Jahncke, in announcing the letting of the contract, said that the bid of the Newport News Shipbuilding and Dry Dock Company was $15,560,000 for the hull and machinery, the ship to be ready for commissioning in forty months. About $4,000,000 more will be expended in providing the armament of the ship.

Bids for the carrier were opened September 3, three companies competing for construction. The limit of cost for the carrier, including armor and armament, was set by the authorizing act of February 13, 1929, at $19,000,000. The Navy Department arbitrarily set the cost for the hull and machinery at $14,600,000, setting aside $4,400,000 for armor and armament. The lowest bid received on September 3 for hull and machinery was $15,560,000.

Recommendations for minor changes in design which would bring the Navy Department's estimates within the limit of cost were presented to Secretary Adams by Rear Admiral Yarnell, chief of the Bureau of Engineering, and Rear Admiral Rock, chief of the Bureau of Construction and Repair.

These recommendations were placed by Secretary Adams before the General Board for consideration. Upon completion of the General Board's study the recommendations were adopted and the contract awarded.

Air Personnel to Be Increased

New York *Times,* October 15.—The Navy Department announced today that the aircraft maintenance force attached to naval aviation will be increased by 560 enlisted personnel as soon as practicable. The decision to add to the force is a result of the findings of the fleet board which convened last May. Rear Admiral John Halligan, Jr., present assistant to the chief of Naval Operations, served as senior member of the fleet board which held its hearings while he was in command of the Aircraft Squadrons, scouting fleet.

The larger part of the enlisted personnel now to be added to the naval aviation maintenance force will be assigned to the Naval Air Stations at San Diego and Hampton Roads. This is in line with the recommendations of the fleet board.

New Fog Signal Demonstrated

Nautical Gazette, October 4.—The ferryboats *Seattle* and *Chippewa* of the Puget Sound Navigation Company are the first boats to be equipped with the new whistle signaling device known as the "Janus" system, designed to prevent collisions in fog by giving the masters or pilots of ships the exact direction or course on which others in the vicinity similarly equipped are proceeding.

The new fog signal was invented by Robert Kamdran, of Seattle, and Captain George Stavrakov, of Victoria, and has recently been demonstrated at Seattle. Ships on which the equipment is installed will be distinguished from others by a double-tone whistle, whereby the course of the vessels will be indicated by means of the time intervals between whistle blasts, in accordance with a special signal code which is interpreted with the aid of a stop watch and compass dial.

GREAT BRITAIN

New Destroyers

The London *Times,* September 19.—Four destroyers now under construction are expected to be launched during the next three weeks. Three of them are for the Royal Navy and one for the Royal Canadian Navy. The former are the *Boadicea,* at the yard of Hawthorne Leslie and Company, Hebburn-on-Tyne, on Tuesday, September 23; the *Beagle,* at the Clydebank yard of John Brown and Company, on Friday, September 26; and the *Brilliant,* at the yard of Swan Hunter and Wigham Richardson on the Tyne, on Thursday, October 9. The Canadian ship is the *Skeena,* the second of two ordered from Messrs. Thornycroft at Woolston, Southampton. She is due to be launched on Friday, October 10. Her sistership, the *Saguenay,* was put afloat on July 11. Of the eight vessels of the *Beagle* class for the Royal Navy, after the foregoing launches only one will remain to be put afloat, H.M.S. *Bulldog,* by the firm of Swan Hunter; her launch is expected to take place about December.

R-Class Submarines

The London *Times,* October 7.—The first of the four R-class submarines, authorized under the 1928 estimates, will shortly be ready for trials at Barrow. There were originally six vessels in this group, but contracts for the *Royalist* and *Rupert,* ordered

from Beardmore and Company, Dalmuir, and Cammell Laird and Company, Birkenhead, were cancelled in July, 1929. Three of the others have been built by Vickers-Armstrongs, and were launched on the same day on June 11 last. The *Regent* is expected to complete in November; the *Regulus* in December; and the *Rover* in January. The dockyard ship of the program, the *Rainbow,* although launched first, on May 14, will not be completed until several months later, probably about the end of September, 1931.

Progress of New Sloops

The London *Times,* October 8.—It has been decided to launch H.M.S. *Fowey* at Devonport dockyard on Tuesday, November 4. This is the first of two sloops of the 1929 program ordered from Devonport. She was laid down on March 24 of this year, and is due for completion by the end of August, 1931. Mrs. Treffry, the wife of Colonel Edward Treffry, C.M.G., O.B.E., High Sheriff of Cornwall, has accepted an invitation to perform the naming ceremony. The second sloop, H.M.S. *Bideford,* was laid down on June 10, 1930, and should be ready for launching early in the new year. She is due for completion in November, 1931. Two other sloops of the same program, the *Shoreham* and *Rochester,* are building at Chatham Dockyard.

The Hydrographic Department of the Admiralty

The *Nautical Magazine,* September.—From time to time reference has been made in the *Nautical Magazine* to the publications of the Hydrographic Department of the Admiralty, and as this important branch of the Navy works not only for His Majesty's ships but for the benefit of mariners in general, it is thought that a short description of the organization and work of that department would be of interest to readers.

The department possesses approximately 3,800 chart plates embracing the whole of the world, and from these over 650,000 charts were printed during 1929. These plates must be continually kept corrected up to date from the latest information received from British and foreign sources, new editions being issued from time to time when the corrections are sufficiently large or important to necessitate it. Moreover, new chart plates are continually being added and existing ones totally reëngraved. Seventy-three volumes of *Sailing Directions* are published and supplements to each are issued annually, bringing them up to date for the more important information received, and new editions are issued roughly every ten or twelve years. Nine volumes of *Light Lists* are published and supplements to each are issued annually and new editions every three years. *Tide Tables* are published in two parts: Part I, which contains "Tidal Predictions for Standard Ports of the World," being published annually; and Part II, which contains "Non-Harmonic Tidal Constants," "Tidal Differences," and "Harmonic Tidal Constants," being published at intervals of about five years, and supplements thereto as required. The Admiralty *List of Wireless Signals* contains details of direction finding, fog signals, weather bulletins, storm and navigational warnings, time signal stations, etc., and a new edition is published annually. There are also various other publications such as distance tables, etc., which have to be brought up to date from time to time.

In order to keep all the above publications on board ships corrected up to date for the more important information received in office, notices to mariners are issued daily to certain authorities, and weekly to ships in general. In 1928 no less than 2,025 of these notices were published and the number is increasing annually.

The technical staff of the department consists of the following naval officers: One rear admiral (hydrographer); one captain (assistant hydrographer); one captain or commander (superintendent of charts); one captain (retired list), superintendent of sailing directions; one commander (retired), superintendent of tidal branch; one commander (retired), for the compilation and issue of notices to mariners; one captain (retired), in charge of light lists; and nine other naval assistants. There are also one superintending cartographer, six chief cartographers, twenty cartographers, and forty-nine draughtsmen.

The production of charts, i.e., the engraving, lithographing, and printing, necessitates the employment, under a superintendent, of no less than 118 engravers, copper-plate printers, litho draughtsmen, etc.

The clerical staff, which includes the staff engaged in the issue of charts and other hydrographic publications, numbers thirty-nine.

The work of surveying afloat is carried out under the direction of the hydrographer by eight of His Majesty's ships, four of which are stationed abroad and four in home waters. Approximately ninety-five officers and men trained as surveyors are employed on this important work. In addition, the Canadian government employs three vessels surveying their own waters, the Royal Indian Marine two, the South African government one, and until recently the Commonwealth government, two.

In accordance with international agreement there is free exchange of hydrographic information between the hydrographic departments of the world, and valuable information is also received from the captains of vessels both of the Royal Navy and the Merchant Navy. In this connection the importance of forwarding any information for the correction of charts and other publications to the hydrographer of the Navy cannot be too strongly emphasized. It is obviously impossible to carry out all the surveying that is necessary with the small number of vessels available, and the hydrographic department is therefore, to a large extent, dependent on information received from other sources for the correctness of their publications. Such information is always acknowledged and carefully scrutinized, and when of sufficient value for the extensive correction of charts, complimentary copies showing these amendments are presented to the sender of the information. It is realized that some officers are averse to sending information to the hydrographer, thinking perhaps that it might be of little or no value. Such, however, is by no means the case, and any information, however apparently insignificant, is welcomed and often proves of great value.

COLOMBIA

River Gunboats

The Engineer, September 26.—The *Cartagena* and her sister-gunboats, the *Santa Marta* and the *Barranquilla*, have safely arrived at their destination, crossing the Atlantic under their own power.

There are many shoals, reefs, and sand banks on the river Magdalena, and the vessels are of special twin-screw design with raised propellers working in tunnels, in order to suit the arduous navigating conditions. The tunnels are fitted with Yarrow patented automatic flaps, which are designed to adjust themselves at varying speeds, so as to offer the minimum resistance and to maintain the tunnels filled.

This arrangement, it is claimed, gives a better combination of carrying capacity, speed, and light draught than can be obtained with any other known system. To ensure rapid maneuvering qualities, two large rudders of the balanced type are provided.

The whole design embodies the results of Yarrow and Company's most recent experience in Mesopotamia, and on the Yangtzekiang River, and it embraces important improvements suggested by model experiments which have been made at the National Physical Laboratary tank, Teddington. Particular attention was paid to the ventilation of the machinery spaces and cabins, having in view the hot climate in which the vessels will be called upon to serve.

The main dimensions of each of the ships, which are identical, are: Length, 137 ft. 9 in. (41.9 m.); beam, maximum, 23 ft. 6 in. (7.16 m); draught, 2 ft. 7 in. (.80 m.). The designed speed, 15.5 miles per hour (25 kilometers per hour), was exceeded on trial, and is high for this type of craft.

As regards the constructional features of the design, the hull is made of galvanized steel, and is provided with adequate subdivision, while the machinery spaces, magazines, and cabins are protected by bullet-proof plating. The cabins, which are well ventilated and airy, are situated on the main deck, and above them is the battery deck carrying the armament, which consists of one 75 mm. gun and four machine guns. There is a wireless telegraphy installation, a searchlight, a range finder, and a military mast with fighting top aft. Electric lighting has been installed throughout, and a refrigerator forms part of the auxiliary equipment. The deck auxiliaries include a motor-driven capstan with a vertical spindle which is placed on the main deck forward, and an electric capstan aft. Two steel motor launches are carried at the stern and extensive sun awnings are arranged for, while the outfit of equipment and stores is a very complete one.

The propelling machinery comprises two Gardner engines, each designed to develop 300 b.hp. at 290 r.p.m. The engines are Norris, Henty, and Gardners' "J" two-stroke type, operating with high compression ignition. Each engine is furnished with a friction clutch and a thrust bearing, and other auxiliary attachments include a special marine governor and variable-speed gear, a two-stage air compressor, circulating water pump, bilge pump, compressed air bottles, and other desirable accessories. In addition to the main engines, there is an auxiliary compressing and pumping set and also an oil engine driven generator set.

All three ships were tried out on the Clyde, with, we learn, highly successful results, a feature of the trials being the small amount of vibration which was experienced.

MERCHANT MARINE

Fast Liners in War

The *Naval and Military Record,* by J. B. Gautreau, October 8.—Fast liners, that played in English and German hands a rôle of some importance in the war operations of the world conflict, are expected to play a more determining part in the wars of tomorrow, and they are likely to make up to some extent for the shortage of ocean cruisers. Not only will the fast modern Atlantic greyhounds mount on carefully prepared gun positions, having both command and arc of fire, heavier ordnance than did the hastily-armed German and English liners (that had nothing above the 4.1- and 6-in. calibers), but they will have the advantage of an under-water protection equal or superior to that of most light cruisers. Since the war every new fast liner in all great countries (but especially in Germany and in Italy) has to be designed in conformity with the minutely prepared specifications of the respective admiralties: armament and ammunition are ordered and kept in reserve for eventual use, and reserve officers, gunners, and specialists in adequate numbers are allotted to each new ship, this novel system being especially applied with studied thoroughness in the remarkable fast passenger liner fleet of Italy, that will shortly comprise some 15 *paquebots* of over 13,000 tons register and 20 knots of less than ten years or age—five times as many as France.

Post-war German liners of the *Bremen, Deutschland, Columbus,* and *Cap Arcona* classes, fitted with antirolling tanks and lateral caissons, besides being elaborately subdivided, have all the advantages of bulge protection, and something besides. Being designed to mount 203- and 210-mil. guns with ammunition bunkers and magazines disposed for handy ammunition supply, they would have every chance of holding their own against light cruisers. Having on board seaplanes (for postal services) with well-trained crews, they would have the means of seeing far ahead and of avoiding disagreeable encounters, such as proved the end of several of their war predecessors. Artificial mists or clouds and every modern trick would not fail them in the hour of need. It is safe to say, from their lead over the whole world, that the German chemical industry is notoriously asserting. Under the new conditions of war an armed merchantman, supplied with up-to-date equipment and with an efficient crew, will have in front of her immense possibilities that formerly belonged exclusively to men-of-war. It will prove a telling strategic asset in the hands of a far-seeing and well-informed admiralty. Fast motor ships from their extensive radius of action give rise to new ocean problems.

France's effort in fast liner building since the war has been much inferior to that of Italy and of Germany. Great French shipping companies and the Rue Royale Admiralty itself are just awaking to the importance, in both peace and war pursuits, of speed and size in *paquebots.* Since the war only one first-class liner has been completed, namely, the *Ile de France,* of 42,000 tons and twenty-three knots, but there is now completing afloat the *Atlantique* (of the Compagnie Sud-Atlantique), of 40,000 tons and 60,000 hp., designed for twenty-three knots and likely to exceed twenty-four knots, and on the stocks at St. Nazaire is the *Lafayette No. 2,* of 27,000 tons and 27,000 hp., and twenty-one knots (at least) with turbines. The 22,000-ton *Lafayette,* fitted with 18,500 hp. M.A.N. Diesel engines of German make, has proved a success and, when necessary, would approach twenty knots, with an extensive radius of action. The second great shipping firm, the Messageries Maritimes (of Marseilles), have many new ships of 15,000 tons register and over in hand, but none is de-

signed for more than seventeen knots. Their eventual use in war for that reason is at a discount, although armament and ammunition have very likely been ordered for them. The super *Ile de France*, ordered at St. Nazaire, will be 304 meters long, 32 wide, and 11 m. 50 deep under water. Her engines of some 180,000 hp. are expected to give thirty knots.

Modernizing Old Ships

The *Nautical Gazette*, October 18.—Ships built ten years ago are now obsolescent, due to recent improvements in propelling machinery. Improved fuel burning and heat-absorbing equipment, together with higher steam pressures and perfected machinery, have reduced the cost of generating power to less than half of what it is in many of the older vessels. A properly designed 10,000-ton, 16-knot ship can now be built to operate on a consumption of bunker oil per shaft horsepower hour, including the production of steam for all purposes, less than half that of older vessels. This improvement in efficiency has been accompanied by simplification and greater reliability, so that attendance and upkeep costs have been reduced rather than increased.

Ships which are now rusting away at the docks, because with their out-of-date equipment they cannot compete with modern ships, are being converted into modern express passenger and freight vessels by the substitution of new propelling machinery.

With high-pressure steam and superheat, air economizers, regenerative feed heating and modern-geared turbines, a 16-knot, 10,000-ton ship can be operated on less than half the bunker oil formerly required.

Many hulls which are laid up because they are uneconomical to operate and are, therefore, obtainable at a low price, can be salvaged and rejuvenated for a long period of useful life by equipping them with new machinery. An example is supplied by the Baltimore Mail Steamship Company, which has recently contracted with the Federal Shipbuilding and Dry Dock Company, Kearny, New Jersey, for the modernization of five cargo vessels of 11,773 tons deadweight displacement, recently acquired from the Shipping Board. These vessels were built in 1919 and 1920 on the Pacific coast at the Union Iron Works plant of the Bethlehem Shipbuilding Company, and were originally fitted with geared turbines rated at approximately 3,000 hp., but the geared turbines were replaced in 1921 on several of the vessels by turbo-electric drive of about the same power.

All of these ships are now assembled at the Federal Shipbuilding Company's plant, Kearny, New Jersey, where the hulls will be lengthened and the bow and stern lines modified according to designs by Gibbs and Cox, Inc., naval architects. At the same time the present propelling units will be replaced by compound turbines and double-reduction gears of 9,500 hp. capacity each, manufactured by the De Laval Steam Turbine Company, Trenton, New Jersey. The new turbines are designed for a propeller speed of 95 r.p.m., which, it is estimated, will drive the ships at approximately sixteen knots, instead of the original eleven knots. Steam is to be supplied from water-tube boilers at 250 pounds pressure, with 150 degrees superheat, and exhausted to a 28½-inch vacuum. Quarters will be added for 100 passengers on each vessel, and other improvements will be made to meet all requirements of modern combined freight and passenger traffic. The vessels are intended for a new service between Baltimore and Hamburg, and are expected to be ready within ten months.

American Institute of Shipping Organized

The *Nautical Gazette*, October 4.—A development of far-reaching importance to all branches of the American marine industry is found in the recent incorporation of the American Institute of Shipping. The charter of this organization was recently granted to a group of well-known leaders in American shipping affairs. These men have spent considerable time in perfecting plans for an organization which will include in its membership representatives of every phase of American marine activity.

The activities in which the American Institute of Shipping will engage are briefly set forth in its "Statement of Purposes," which reads as follows:

> This organization exists for the interchange of ideas and the dissemination of information relative to ship operation. Attention is focused on cargo handling, safety engineering, and the selection, training, and compensation of employees. These and other subjects are considered in meetings for general discussion, in pamphlets and bulletins prepared by a trained staff, and through

studies by committees especially assigned to specific problems.

Modern American management now renowned the world over, has emphasized the value of profiting from one another's experience. So significant has this idea of coöperative exchange of experience become that a common test of good management is a willingness to profit from the experience of others.

The American Institute of Shipping, by providing a medium for the interchange of ideas and information, will assist its members in increasing the prosperity of individual interests, and will result in benefit to the entire American merchant marine.

Membership classification has been divided into twenty groups, embracing every branch of American marine activity, as follows:

1. Shipowners and operators.
2. Tugboat and lighterage operators.
3. Stevedores and cargo handlers.
4. Railroad officials.
5. Shipbuilders and ship repairers.
6. Naval architects and marine engineers.
7. Financiers.
8. Marine underwriters, brokers and adjusters.
9. Admiralty lawyers.
10. Educators.
11. Manufacturers of marine and terminal equipment.
12. Executives of trade associations.
13. Executives of labor organizations.
14. Consulting engineers.
15. Shippers.
16. Employees in shipping industry.
17. Dock and terminal operators.
18. Shipping press.
19. Staff of classification societies.
20. Government officials.

The organization of the Institute is now being perfected, and names of the officers and directors will be announced shortly.

The Jones-White Law gave great impetus to the American merchant marine, as it provided government aid, through mail subventions, to overcome the operating differential between American ships and their foreign competitors. The American Institute of Shipping is founded on the belief that supplementing government aid should be self-aid—the endeavor on the part of the marine industry to reduce operating costs by every means known to any form of industry. The Institute will function to bring about coöperation between shipowners and operators, and through the medium of thorough organization of the shipping industry, coupled with research, to aid in bringing about greater efficiency, economy, and scientific management. In this field of progress is a real American answer to the much-discussed problem of our merchant marine.

ENGINEERING

Test Diesel Engine for Navy Launches

The New York *Times*, Washington, October 16.—Extensive tests of a 50-horsepower Diesel engine by the Navy to overcome the fire hazards of the storage and use of gasoline for motor boats have given very satisfactory results, the department announced today. The tests are being made at the Engineering Experiment Station near Annapolis. The experimental engine will now be placed on board a ship for tests under service conditions.

The engine under test has been run for about 225 hours and started, stopped, and maneuvered about 600 times, using Navy standard Diesel oil, with practically no difficulty in operation.

After dynanometer tests the engine was installed in a fifty-foot motor launch and placed in regular service. During warm weather no difficulty was experienced in starting or operation. In temperatures below freezing difficulty in starting was experienced, but this was eliminated by the installation of more powerful starting equipment.

The hourly consumption of fuel of the Diesel engine was about 40 per cent of that of the gasoline engine. Lubricating oil consumption was slightly less.

"The engine operates quite satisfactorily under all conditions so far to date," the experiment station stated. "It is very easy to operate and requires very little attention. It has been operated by twelve different men and they have had little instruction. Even under these conditions there have been no major repairs or adjustments required."

The engine makes 850 revolutions a minute. A planetary type reverse gear is an integral part. All the castings are of iron or steel and no attempt has as yet been made to decrease the weight. Navy engineers estimate that the weight could be decreased about 40 per cent by redesign and the use of light alloy castings or stampings in place of the heavier metals.

Cutless Rubber Stern Tube Bearings

The *Nautical Gazette*, October 11.—The B. F. Goodrich Rubber Company claims that the development of cutless rubber stern tube bushings to resist abrasion has overcome a difficulty encountered in the construction of screw-driven power boats.

The cutless bearing consists of several rubber surfaces against the drive shaft, separated by longitudinal grooves which serve to carry off the sand particles turned over the rubber surface. Resiliency of the rubber prevents cutting of the shaft. The film of water provides lubrication. It is claimed that these bearings used in experimental work in all types of ships have been known to outwear babbitt and wood bearings as much as nine or ten times.

Development of rubber stern tube bearings has taken place over the last ten years or so, and there has been considerable use on small craft with shafts up to about 7 inches. Even now use with a 12-inch diameter is recognized, and the ferryboat *Dongan Hills* uses rubber on a shaft of about that size. Now a 30-inch diameter of bearing is mentioned. It will be interesting to see whether rubber will ever displace lignum-vitae for stern tube bushings of very large sizes.

Big Electric Generator

New York *Times*, October 7.—The largest electric generator ever constructed has recently been placed in operation furnishing electric power to Chicago, according to *Boston Business*, official organ of the Boston Chamber of Commerce. This machine is rated at 208,000 kilowatts, or approximately 278,820 steam horsepower.

"There are three generating units," the article continues, "consisting of one high-pressure turbine driving a generator of 76,000 kilowatts and two low-pressure turbines, each driving a generator of slightly smaller capacity. The high pressure turbine uses steam at 650 pounds per square inch and the two low-pressure turbines at 110 pounds per square inch. Electricity is generated at 22,000 volts pressure. The station containing this huge generator is located on Lake Michigan, just at the Illinois-Indiana State line.

"When operating at full power, more than two tons of coal per minute must be burned to make steam, and to condense the steam after it has passed through the turbines, 380,000 gallons of lake water per minute must be pumped through the condensers. Steam is supplied by six boilers each capable of evaporating 450,000 pounds of water into steam per hour.

"The large power unit is more than twice the size of any other generator located in the Middle West and is considerably larger than the two huge generators recently placed in commission in New York City.

"With this new generator in commission, the total horsepower of the electric generating stations serving the Chicago district is 2,034,450 horsepower."

New Nickel-Copper-Chromium Cast Iron for Diesel Engine Castings

The *Nautical Gazette*, October 4.—Development of an alloyed cast iron which makes for simpler design of internal-combustion engines has been reported to the American Society for Steel Treating at its twelfth annual convention in Chicago, September 22-26.

J. S. Vanick and P. D. Merica, of the International Nickel Company, collaborated in a paper which described a nickel-copper-chromium alloy of cast iron, the expansion coefficient of which approximates that of the aluminum alloys used in the construction of cylinder heads and pistons. Thus, this alloyed cast iron—known as Ni-Resist—permits the construction of cylinder blocks which will expand under heat conditions at a rate more closely in accord with the expansion of the pistons than ordinary cast iron will.

This iron is essentially a corrosion and heat resisting material.

"Field service tests under a variety of conditions," according to the paper, "have confirmed in general the results of laboratory tests in establishing a greatly increased service life for this material as compared with plain iron, and a life comparable in many cases with bronze.

"It has been further demonstrated that this material, except for being considerably more corrosion and heat resisting than plain iron, is in general quite similar to it in characteristics and fabricability. Thus, it can be produced in the ordinary cupola, and can be molded, cast and handled in foundry and machine shop under conditions similar to those in practice for gray iron."

The composition of such a material is given below:

	Min.	*Max.*
Total carbon	2.75%	3.10%
Silicon	1.25	2.00
Sulphur	0.04	0.120
Phosphorus	0.04	0.30
Manganese	1.00	1.50
Nickel	12.00	15.00
Copper	5.00	7.00
Chromium	1.50	4.00

It may be interesting to add that independent experiments along the same lines as those given in the abstract were conducted by J. Arnott, of G. and J. Weir, Ltd., of Glasgow, England, and have led him to substantially the same conclusions concerning—first, the best composition for this nickel-copper-chromium cast iron; secondly, its corrosion and heat resisting characteristics; and, finally, its commercial possibilities.

One of the chief assets of this corrosion-resisting iron is its low cost. Its application is useful wherever a corrosion or heat resistance superior to that of plain cast iron is necessary. In view of this, it has been made into such castings as pipe, valves, fitting, pumps, compressors, marine castings, boiler specialties, engine castings, subjected to heat or corrosion, conveyors, propellers, impellers and hydraulic turbines, stove and furnace parts, oil burners, glass rolls, enameling racks, and similar types of castings, going into the oil, coal, coke, caustic, sugar, glass, and other industrial or chemical operations.

It is nonmagnetic and this characteristic has led to the active consideration of its introduction in the electrical industry for such parts as transformed bushings, magneto rotors, welding machine parts, resistance grids, etc.

Its high coefficient of thermal expansion has led to its application as a sleeve in internal-combustion engines, airplane, automobile, and marine engines in conjunction with trunk-type aluminum alloy pistons which possess a corresponding expansion under heating.

Its resistance to growth and scaling has led it into applications requiring high temperature stability, and it has substantially reduced the occurrence of fire cracks or surface checking and practically eliminated the difficulties grouped under the failures attributed to "thermal stresses."

The ease with which this material has been handled in the foundry and shops, and the emphatic way in which it has answered the need for a cast iron of exceptional merit in its particular field have enabled it to establish itself firmly and in daily increasing amounts for numerous applications which make use of its special properties.

The coefficient of thermal expansion for temperatures up to 600 degrees Centigrade is 50 per cent greater than that of plain cast iron, and therefore similar to that of bronze. This factor has been useful in development work in connection with its use as a sleeve in automotive, aëro, and marine engines in conjunction with aluminum alloy pistons.

The large amount of nickel and chromium which is present in the cast-iron composition would indicate immediately that it is suitable for service at elevated temperatures. The resistance to oxidation of the ordinary composition is quite marked at temperatures in the range of 1,200-1,500 degrees Fahrenheit, and may reach a value of 10 to 12 times more resistant to oxide formation than plain cast iron in an oxidizing atmosphere. As the temperature increases, this degree of improvement diminishes until at temperatures in the range of 1,600-1,700 degrees Fahrenheit, the difference is considerably reduced.

The alloy (of normal composition) is nonmagnetic and has a high electrical resistivity (1¼ per cent of copper conductivity). Its character with respect to electrical properties is essentially that of the austenitic, high nickel alloys. By special heat treatments or manipulation of its composition, it may be made magnetic or nonmagnetic without changing its basic property of resistance to corrosion.

This material is unusually well suited for welding by arc or acetylene and by the use of filler rod of the same composition. The weld produced is soft and machinable, with no hard ridges. It is adaptable as filler rod for the welding of plain iron as well.

This nickel-copper-chromium cast iron has been applied in general wherever a corrosion or heat resistance superior to that of plain cast iron was required. Its corrosion resistance in general is very much better than that of plain cast iron, and it will frequently equal that of the bronzes. However, its corrosion product is a rust deposit which forms very slowly and evenly over

the surface. For this reason it cannot be used where freedom from rusting is essential. Its heat resistance is far superior to that of plain cast iron, but it should not be expected to equal that of the high nickel-chromium types of alloys.

The Limit to Steam Temperature

The *Engineer,* September 12.—The decision of one of the Belgian power companies to use steam at a temperature of 470 degrees Centigrade or 878 degrees Fahrenheit at the turbine stop valves, and at a pressure of 1,500 pounds per square inch, brings home to engineers the enormous advance in steam conditions which has been made of recent years. Nor can the plant to be put down be regarded as of an experimental nature, unless the term is stretched far beyond its usual meaning. An installation starting with two 82,000-kilowatt turbo-generators, together with the necessary boilers and auxiliaries for their operation, is something outside the scale of experiments. It should rather be regarded as the logical outcome of previous developments in power station design, although the courage with which the frontiers of experience are being exploited in all directions at once gives to the new station a noteworthy place in power plant engineering.

The theoretical considerations which urge the use of the highest possible temperatures and pressures are leading to continually greater temerity in practice. So far, fortunately, wisdom appears to be justified of her children. Pioneers like Monsieur Herry as regards temperature and Mr. Moultrop as regards pressure, have borne witness to the attainment of the economies foreseen. Moreover, the experience of these and other engineers tends uniformly to show that plants working under the severest steam conditions of today are as free from accident and trouble as those of the most conservative design. All this is very reassuring. It consolidates the ground already won and gives encouragement for further progress. But it also raises the question as to the point at which increases in temperature and pressure will have to stop. One cannot be considered without the other, for, as regards pressure alone, in hydraulic work pressures far higher than steam is likely to be used have been employed for generations, and higher pressures still are certainly feasible. But hydraulic pressures are exercised at ordinary temperatures, where metals have the strength and other properties with which we are familiar. Raise the temperature high enough and the metal will melt, losing all cohesive strength whatever, so that there is certainly some intermediate temperature which must not be exceeded if any desired tensile strength is to be retained. Hence, there is a temperature beyond which it will not be practicable to use steam, and no question is of more interest to central station engineers at the present time than what this temperature is. If it could be settled, for any given metal, by conducting ordinary tensile tests on specimens heated to different degrees, there would be no difficulty about the matter. But such tests give relatively little guidance. Under a load far less than sufficient to cause immediate rupture, a heated steel test piece may stretch for weeks or months. If the load is not too great, the piece will eventually stop stretching and will apparently carry the load indefinitely without further deformation. Otherwise, it will continue to stretch till it breaks. This is about all that anybody really knows concerning the strength of metals like steel at high temperatures. Or perhaps it would be more correct to say that it is all that the majority of investigators have agreed upon. Professor Lea gave a certain precision to the idea by the proposition that for every temperature there is some critical stress, below which the metal will in time cease stretching, and above which stretching will continue until fracture occurs. This critical stress obviously corresponds, from the designer's point of view, with the ultimate breaking stress at ordinary temperatures, for disaster will surely occur if it is exceeded. Following the same line of thought it would seem possible to decide on a safe working stress at any temperature by finding first the critical stress and by then allowing a sufficient margin for safety. The length of time, however, that certain materials will continue to stretch before one can be sure what they will eventually do, makes the direct determination of critical stress both tedious and difficult. In the laboratory of the Westinghouse Company a piece of .33 carbon steel loaded with 25,000 pounds per square inch and maintained at a temperature of 400 degrees Centigrade, was kept under observation for 340 hours, and it

stretched continuously the whole time. A copper manganese alloy at the same temperature was still stretching after a test of 570 hours, although only loaded with 5,000 pounds per square inch, or half of its "proportional limit" stress at 400 degrees Centigrade. Tests of such duration are practically impossible in ordinary manufacturing, and it will, furthermore, be noted that in neither case was the time long enough to determine whether the critical stress of the material had been exceeded or not.

Some more speedy method of finding the critical stress is obviously needed. Professor Lea, observing that after a comparatively short time, the rate of creep for any given stress and temperature appeared to become constant, proposed to plot these constant rates of creep against stress for each temperature. By extrapolating the curves so obtained down to the base line of zero creep, the critical stress for each of the temperatures could be read off. Hence a curve showing the relation between critical stress and temperature could be plotted for any material. The same method has been adopted by continental physicists. It was employed in the elaborate *études* of the pipe work for the power station of Issy-les-Moulineaux, where steam at 625 pounds pressure has to be carried at a temperature of 450 degrees Centigrade. But how far it is to be relied on is another matter. It depends on the existence of a constant rate of creep, and unless such a phenomenon really exists the method has no logical foundations. At best it would seem doubtful whether the rate of creep can ever be more than approximately constant. All observers agree that the initial rate is comparatively rapid, and tends to become slower. Any subsequent period of constancy must be followed either by a rapidly increasing rate before fracture, or by a rate diminishing to zero. The graph must therefore have curves on both sides of its central portion so that for any part of this portion to be really a straight line, the low governing the rate of extension would have to change twice during the test. This is improbable. Furthermore, the time required for even approximate straightness to be obtained may be too long for a practical test. A specimen at the National Physical Laboratory took thirty days before the rate of stretch became sensibly uniform, and in another test in the same laboratory constancy of rate was not obtained in 142 days, although by that time the total elongation amounted to 11 per cent. It is evident from these facts that the determination of the critical strength of any material at a series of temperatures may be an extremely tedious process. Supposing it done, however, all we know is the stress which will ultimately cause fracture at any given temperature. But fracture is not the only thing which may terminate the working life of the metal. A steam pipe, for example, which would stretch 11 per cent in twenty-two weeks' working would be no use in a power plant, even though it should eventually stop stretching and never burst.

An alternative, and very plausible method of design is based on keeping the working stress below the elastic limit at the working temperature, with the idea that under such conditions no permanent deformation at all could occur. But this presupposes that there is such a thing as an elastic limit at the temperature desired. The formation of slip bands, indicating a minute permanent deformation at very low stresses, suggests that what is known as the elastic limit is something depending on the strain hardening of the material. It is moreover, only strain hardening which can account for the arrest of the stretching of a test piece when the critical stress is not exceeded. If, therefore, the metal is maintained at a temperature above that at which strain hardening is removed, it would seem that it could have neither an elastic limit nor a critical stress. It would, indeed, become permanently ductile. For ordinary mild steel, this condition is probably reached in the neighborhood of 550 degrees Centigrade, which sets an upper limit to working temperatures with such metal. The designers of the pipe work at Issy-les-Moulineaux, to which reference has already been made, found in the course of their experiments that the same kind of elastic phenomena which are familiar at ordinary temperatures were to be observed in steel at a temperature of 450 degrees Centigrade. They therefore determined the elastic limit at that temperature, and fixed their working stresses sufficiently below it to give a reasonable margin of safety. This kind of procedure would seem logical, and we believe it has been followed in other important installations. Yet it may be far from sound in all cases. In the discussion on Mellanby

and Kerr's paper on "High-pressure Steam," before the Institution of Mechanical Engineers, Mr. R. W. Bailey quoted an instance in which metal stressed considerably below its elastic limit at 400 degrees Centigrade continued to stretch for over two years. Facts such as this are disconcerting, to say the least, for 400 degrees Centigrade is now looked on as a very conservative steam temperature. We know, on the other hand, that no permanent change of length has been detected in the pipe work at Langerbrugge, where steam at a temperature of 450 degress Centigrade and a pressure of 800 pounds has been carried for years. It is, indeed, the wonderful absence of troubles due to temperature in stations where the highest steam temperatures are in use that encourages engineers to try still higher temperatures. But there must be a limit imposed by the softening of metal, and it is becoming urgent to establish the true relationship between temperature and permissible stress for all such steels as are used in power plant work.

AVIATION

Carbon Monoxide Hazard

Aviation News, September 27.—In the face of recent events centering attention on carbon monoxide gas and its danger to pilots, the Navy Bureau of Aëronautics, medicine and surgery department, is making plans to investigate the degree of hazard airmen are subject to from this source.

The presence of this deadly substance on his most recent attempt to fly the Pacific nonstop forced Lieutenant Harold Bromley to return to Japan, his starting point. It is said to have come very near causing disaster, leaving Bromley and his co-pilot semiconscious at times.

He later expressed the belief that this poison may have directly or indirectly caused the death of "missing" transatlantic fliers.

Carbon monoxide was also believed to be an important factor in the death of Captain Arthur Page at the National Air Races. However, a post mortem conducted by Lieutenant Commander Joel J. White, flight surgeon, revealed the body contained less than one-half of one per cent of the gas. It has made trouble on a number of racing planes in the past, especially on Lieutenant Alford William's Mercury racer in 1929. Lieutenant Williams was wholly overcome on one occasion while taxiing.

Rear Admiral William A. Moffet, chief Bureau of Aëronautics, declares naval aviation has not been bothered to any degree by this danger, Navy craft being equipped with collector rings designed to protect pilots from such trouble. Pilots have reported noticing the fumes, but have never been seriously affected by them. Carbon monoxide itself has no odor, and the gases oppressive to the senses are not the dangerous ones.

Calling attention to the fact that carbon monoxide occasionally seeps into closed automobile bodies the automotive research division of the Bureau of Standards sees where a similar situation might occur in the case of cabin planes. No investigations of the matter have been carried on by this agency, however, and it is not yet known just how the Navy bureau will conduct its experiments, though it is intimated that wind-tunnel tests might be employed in the work to be undertaken along these lines.

Lieutenant Commander White, while favoring research along these lines, is of the opinion that though carbon monoxide might have been a contributing element in the fatality of the cross ocean aviators, it was probably not the direct cause of the disappearance of these persons.

The Coste and Bellonte Flight

U. S. Air Services, October.—When Charles Lindbergh transferred himself at a bound from New York to Paris he won the world's acclaim, and that acclaim has never been withdrawn—his fame has never waned. When three years later Dieudonne Coste performed a similar exploit in reverse direction the world's reaction was the same. He won in thirty-seven hours a popularity and a fame as great as that of Lindbergh and equally enduring. The distinction that these great flights have conferred upon the performers is something sole and ultra. What they did required more than the usual mead of praise—it demanded and it won a perpetual ovation. More dangerous flights have been made; longer ones have been made; more difficult ones have been made. Why, then, the special acclaim, the fadeless fame, accorded these?

The answer is plain. It was their perfection—their noiseless, unlabored, premeditated and yet spontaneous perfection. In this respect nothing to exceed them has ever been done and nothing to exceed them ever will be done. The world admires brilliance, it respects power, it marvels at skill, and it copies wisdom. These are but parts, however, of that perfect whole, that whole that is itself perfection. At the spectacle of perfection the world first cheers—or hisses—but afterward it bows in adoration. The perfection of the Lindbergh and Coste flights has won its adoration—won it to keep it and to keep it for all time.

Pages might be written expatiating on this theme and citing instances in point. The perfection of their preparation, their equipment, their plans and the execution of them. The perfection of the performers' individual poise, their modesty, their silence before and their unaffected reticence afterward. Suffice it to present one circumstance in point. It is chosen because it enfolds the major cause of all ocean flight failures and tragedies, and yet was incompetent to frustrate or deter these men. They respected its threat, but they circumvented it with the ease and confidence of a master. The threat was adverse weather. Its circumvention the perfect timing of each exploit.

Had either man taken off at a less propitious moment all his skill would have gone for naught, all his preparations been useless, his equipment worse than wasted. Count the cases where this one factor has been improperly appraised and stand aghast at the tragedies passing in review. On the other hand observe the very exceptional meteorological conditions which prevailed to favor the execution of the two New York-Paris flights which so spectacularly succeeded. A distinguished scientist has said that between April and September, inclusive, in the year Lindbergh made his flight there were only four really favorable periods for its execution from the standpoint of wind and weather. Lindbergh chose unerringly one of the four.

How many such periods there may have been for a flight in the reverse direction this year no authority has ventured to say, but it is certain that they have not equalled those which favored flights from west to east. But whether they have been few or many Coste chose one of them, and chose it as unerringly as Lindbergh chose his.*

Their means of information, of course, were not occult. They went to standard sources. They were given standard data. But they used more than standard sagacity in their interpretation. The rule of perfection was at work, and at work in their behalf. In Coste's case it easily meant the difference between success and failure, because, as is well known, the weather hazards of an east-to-west flight greatly exceed those of a flight from west to east. This is demonstrable not only by appeal to the most obvious facts of meteorological science, but also to the actual record of attempted flights in each direction. Numerous flights have been made from west to east, but of all who have essayed it in the opposite direction only three (airships excepted) have flown successfully from the old world to the new, and of the three Coste is the only one to pass nonstop from continent to continent.

The reason for the odds against east to west flying is mainly the opposition offered by the prevailing winds, which have a preponderant eastward drift in the latitudes where all nonstop flights must perforce be attempted. This preponderant drift is directly associated with the belts of high and low atmospheric pressure which span the northern oceans—the high belt lying in tropical latitudes and the low belt on its poleward side. The winds in these two belts roughly parallel the main axes of the so-called "High" and "Low." When the "High" is in its normal position to the south of the "Low" all winds between their respective centers have a marked eastward set. Now if we should find their positions reversed, the "High" in the north and the "Low" in the south, the winds between them would be correspondingly reversed—their set would be from east to west instead of from west to east. This was the extraordinary situation prevailing when Coste took off. Weather charts of that and the preceding day indicated that instead of encountering head or quartering winds, for at least half of his course he could count on winds from astern—the belt of high pressure lying

* Note: Gregg has calculated from inspection of ten years' charts that for flights from Ireland to Newfoundland an average of 3 days a year have been "excellent," 14 "good," 18 "fair," and 330 "poor." (*Aëronautical Meteorology*, rev. ed., p. 330.)

between the British Isles and Greenland, while to the southward barometers were relatively low with a distinct depression charted between the Azores and Spain.

Such was the break that Providence accorded Coste and Coste with Lindberghian alertness grasped it.

Planned Italian Flight across South Atlantic

New York *Herald Tribune*, October 5, by Ralph W. Barnes, Rome, October 1.—Twelve powerful Italian military hydroplanes of the S-55 class are being put into condition to participate in what, if it succeeds, will be one of the outstanding aëronautic events of history—a squadron flight in three or four stages from Rome along the northwestern African coast and across the south Atlantic to Brazil. While preparations are being made with the greatest secrecy, it is known that the daring venture, several times postponed, is now scheduled for December.

General Italo Balbo, Minister of Air, and General Valli, his chief of staff, will lead the air flotilla, which will be divided into two squadrons of six planes each. The hydroplanes will carry an average of five men each, so in all sixty men will participate in the flight. The pretentious project is believed to have two principal objects—first, to call the world's attention to the progress of Italian aviation and, second, to stimulate trade between South American countries and Italy.

Present plans call definitely for a visit by the flotilla to Argentina as well as to Brazil, and it is presumed that if the venture is crowned with success still other South American and even Central American countries will be included in the itinerary. From Italy to Brazil the twelve planes are expected to follow a course similar to that taken by Di Pinedo on his historic crossing. They will make one stop on the west African coast, a second on the Cape Verde Islands and a third at a convenient island off the Brazilian coast, such as Fernando Noronha, or, if possible, at some point on the Brazilian coast itself.

Squadrons of S-55 planes have made several long flights over the Mediterranean area in recent months in preparation for the transatlantic attempt. In the course of the most recent of these—westward to the Spanish coast and back—the plane in which General Valli was riding was forced down in a choppy sea. A Greek vessel picked up the fliers and towed the plane back to a Spanish port.

The Italian fliers have established their camp at the airport of Orbetello on the coast a short distance north of Ostia, and the start of the transatlantic flight will be made from there. Three of the planes scheduled to participate in the crossing already have been delivered at Orbetello, and the finishing touches are being put on the other nine in the airplane factory on Lake Maggiore.

The S-55 is a monoplane which, when in the water, rests on a pair of cabin boats. Two engines are in tandem above the wings. A central cabin for the pilots is suspended between and slightly above the two boats. Except for obvious modifications for civil purposes, the planes now being used on the Boston-to-New York air route are almost identical with those which will be used in the flight to America.

The S-55 is considered by air experts to be highly trustworthy and to be especially fitted for an Atlantic crossing, because of its "seaworthiness." These machines are adapted to take off and come down in rough water as a result of the height of the wings above the water line and the arrangement of the pair of boats. During the recent Mediterranean flights much had been done toward perfection of the navigation instruments to be used.

It has not yet been decided whether Isotta Fraschini or Fiat engines are to be installed for the flight. The two engines under consideration are of about the same weight, horsepower, and style, and both are geared. Geared engines permit the use of larger propellers and thus afford more efficient propeller speed. Whether one or the other make of engine is finally chosen, the pair of engines on each plane will develop about 1,200 horsepower.

The "R-101" Disaster

Army, Navy and Air Force Gazette, October 9.—The progress of aëronautics has been maintained throughout the years at a heavy but declining cost in human lives, a cost which those with faith in the future of air transport have been willing to pay. Now when the science is passing from infancy there is a disaster greater than any in

previous days. A great experimental ship has gone with forty-seven men at a time when it was hoped to prove that large airships would in the future take an important part in the maintenance of imperial communications. Among those who lost their lives at Beauvais on Sunday morning there were men whose knowledge of airships and whose skill in their design and control were not surpassed in any other country in the world. The country can ill afford to lose them, for they combined ability and bravery in a degree equal to that of the past gentlemen adventurers who built the empire by their excursions into the unknown. They were all picked men, from the cabinet minister who had given ardent support to aëronautics to the humblest member of the crew. Their death has been splendid because they died at work and in the attempt to bring greater glory to their country. Death in action against the country's enemies would be no finer. In the flood of sorrow and regret that has swept through the nation and, it is true to say, through the civilized world, there should survive a spirit of determination that their work will not be in vain and that other hands will be helped to take up the task for the greater glory of those who have gone.

It is natural that those who have at all times expressed disbelief in the civil and military uses of airships should claim that the end of *R-101* proves the accuracy of their past arguments. Every kind of cause for the accident has been selected by these "experts" and by the reporters of the more spectacular newspapers. None is ready to wait until a proper official report is made. As was the case at the time of the *Titanic* disaster, deliberate slander has not been absent from the tales which float about in print and in speech. Yet there is one self-evident fact, and that is that the accident was not due to carelessness or misbehavior of any member of the party in the ship.

The *R-101* was an experimental ship. Her size was much greater than that of any other airship in the world. She was the first to be constructed with a steel frame and the first to be fitted with heavy oil engines. If she had been successful in her trial flight to India and back it could have been claimed at once that the British had made a very great advance in airship design. Her loss does not prove that the theories of the "big airship" school were wrong. Seventy-six years ago the *Great Eastern* steamship was built. She was about twice the size of any existing vessel and more than thirty years had to pass before a greater vessel was built. If the *Great Eastern* had sunk in her first great voyage there would have been people sufficiently stupid to argue that there was no future for big steamships. They could not scoff at steamships as there were large numbers in existence giving daily proof of their value. Unfortunately there were only two great airships in Great Britain, and the loss of one of them makes the disaster appear to be greater even than it must be admitted to be. The *R-101* may have been too far in advance of her time, and there may have been too many experiments combined in her design. In any case her end has not proved that airships are unsafe and impracticable. There have been many very successful airships, and if the disasters directly due to warfare are omitted from the list their record has been good. Thirteen years have passed since a Zeppelin flew from Bulgaria to the Dakla Oasis, halfway down the continent of Africa, without mishap. Many great flights have been made since then and the death roll has been small. Airships are still in the experimental stage, but the time has been reached when big development should be possible.

It may be hoped that the accident to the *R-101* will not prevent the government from continuing experiments for the development of airships. If it is decided that more large ships shall be built, then money should also be provided for the construction of a number of smaller ships for the training of airship crews. The lack of small ships has harassed all those concerned in airship work. It would be absurd to expect a crew of sailors to endeavor to take the *Mauretania* from Southampton to New York if that crew had only been at sea for a few days during the course of the past ten years. More than half of those with recent experience of airship flying have gone in the *R-101*, and we must now undertake the training of further *personnel*. Let the memorial to those who are dead at Beauvais be further experimentation with airships. The question of cost is not so important as some would like to make out. Much of the money which has gone on the two airships has been spent in establishment charges, which

need not vary very greatly if instead of two ships there are ten. The country may be poor, but it can and should spend money on progress.

Safety in Flying (see p. XLVII this issue)

Aviation, October, 1930.—One particularly interesting development during recent weeks, that calls for enthusiastic support from all sides, is an airplane parachute developed by the Russell Parachute Company, and sponsored in public test by the Detroit Aircraft Corporation. Although dropping a plane by parachute has been tried before and with little success, the results of the test recently conducted in Detroit give every indication that another definite step toward the reduction of accident-life-loss has been, or is about to be made.

Although the plane was damaged in the landing, its pilot Vance Breese was unhurt, and later issued the statement that the landing shock was no greater than that experienced in a normal bad landing. We sincerely hope that developments will be continued and the perfected product installed in every transport plane. Even though the occasion never arises to make use of a plane chute the fact that it is there ready to perform its duty in case of necessity will have a most comforting effect upon the nervous air passenger.

Yet with our praise of this new and possible air accident mortality rate reducer we add a word of caution. Let us not be completely content with it as such. No one device is going to prevent accidents, or even reduce them to a considerable lesser degree than they are now. It will be a combination of safety improvements which will eventually place the airplane on a high safety level. For instance, a plane parachute is of little use if the plane catches on fire. It is of no use if the plane flies into a mountain side. Hail, to the plane with a parachute, and a double hail to the fireless airplane and the non-mountain hitting ship!

MISCELLANEOUS

The Strategy of Singapore

By Nicholas Roosevelt, from *Foreign Affairs*.—Singapore guards the western gateway of the Pacific. Situated at the extreme southeastern corner of Asia, where the tongue of the Malay Peninsula protrudes into the East Indies, it is so favored by geography that ships plying between Suez and Japan as well as between India and Australia must pass within a mile of it. Off Singapore the waters of the Indian Ocean, the China Sea and the Java Sea meet. Like Panama, Gibraltar, and Suez, it is one of the great focal points for shipping, where geography forces far-flung lines of communication to converge.

The strategical significance of Singapore was first appreciated by Sir Stamford Raffles, agent for the East India Company, whose brilliant career and services to the British Empire have never received proper recognition. He it was who in 1819 planted the British flag there, only to be scorned and denounced by the Little Englanders of his day. "It gives us," he wrote a friend, "the command of China and Japan, with Siam and Cambodia, to say nothing of the islands (the Dutch East Indies and the Philippines) themselves." Within a half century of his unsung death the city which he founded was one of the great ports of the world. Today as much commerce flows past it as through Panama or Suez. Its importance as the great Eastern outpost of the British Empire is at last being realized, despite the efforts of pacificists and present-day Little Englanders to discredit it. As early as 1882 the first elements of a naval base were laid down, but only in 1921 was it decided to ask Parliament for £10,500,000 to make Singapore the principal naval station in Eastern Asiatic waters.

. . . . .

Aside from the general geographical position of Singapore in relation to trade routes, the local features are favorable for the creation of a naval base with ample storage facilities. Singapore is an island which fits like an egg into the cup of the Malay Peninsula. On the southern or outer edge, nearest the shipping lanes, is the commercial harbor and the city of 500,000 inhabitants who live by its trade. On the northern or inner portion is the site of the base, with ample anchorage space. It is protected from the sea by the surrounding low hills. The outer approaches through Dutch and English owned islands are readily defensible by mines and nets.

The base itself is to consist primarily of docking and storage facilities, rather than of costly defense fortifications. The reason

for this is that the British fleet in Eastern waters is at present forced to depend on distant stations for supplies and repairs. This is particularly true of capital ships that cannot be dry-docked at any point short to Malta, thirty-one days steaming distance from Singapore. There is at present in Singapore a commercial dry-dock capable of handling ships of less than 10,000 tons. As part of the new naval base development a floating dock was shipped to Singapore and installed during the latter part of 1928, for the purpose of handling larger ships. At the same time the oil storage facilities were completed, and the provision depots planned with sufficient thoroughness to insure adequate supplies for Singapore so long as it does not fall into enemy hands.

The island is connected with the mainland by a granite and concrete causeway through which runs an aqueduct and over which is an excellent road for motor lorries and a double-track railway. The presumption is that in the event of war it would be possible to supply Singapore overland from some port near the Indian end of the Malacca Straits. This causeway was at one time severely criticized by naval experts because it shuts off one of the two sea approaches to the base. The economic consequences of linking the island with the hinterland would seem, however, to outweigh these naval objections.

Not only in the United States where the rôle of bases in naval operations has never been generally understood, but even in England, the question "Why Singapore?" has often been raised.

The answer, apart from the geographical factors already explained, is to be found in a further consideration of the functions of naval bases in peace as in war. The popular conception of a naval base as a highly fortified rocky eminence, like Gibraltar, is largely misleading. While a base must be safe from attack, its chief purpose is to give the fleet greater mobility in important strategic centers. This means primarily to provide fuel and supplies of all sorts, and to furnish adequate docking facilities so that in peace the ships' bottoms may be scraped and in war the necessary repairs made. A fouled bottom reduces a battleship's cruising radius, as well as its speed. In tropical waters it is particularly necessary to dock ships frequently in order to remove the rank growth that accumulates on them.

As a matter of fact it may be said that a fleet without a naval base within striking distance is much like an automobile in the Sahara. In war an injured ship has a chance of recovery if it can reach a near base. But if it has to travel many thousands of miles it is in imminent danger of annihilation. The existence of a well-developed naval base with dry-docks and supplies at Singapore therefore greatly increases the mobility of the British fleet in Pacific and Indian Ocean waters, and so affords to the British possessions in these regions that same degree of protection which other portions of the empire now enjoy.

The most succinct summary of the wherefores of the Singapore base was made by Mr. Amery, First Lord of the Admiralty, from 1921 to 1924, speaking in Parliament on March 18, 1924:

> Singapore is essentially in a British part of the world. It is actually the point of one of the richest and most progressive parts of the Empire. It is the key to the Indian Ocean, round which lies three-quarters of the land territory of the Empire. The Great Southern Dominion, India, and our East African possessions lie around that ocean. Three-quarters of the population of the Empire is around it also. We have not a single base in all that vast region at which a modern ship could be fitted or repaired. . . . . There passes through that ocean every year something like £1,000,000,000 worth of our traffic and a great deal of other traffic belonging to the rest of the Empire. Something like £160,000,000 worth of our ships and cargo is afloat in that ocean at any minute of the day. Singapore is the one point from which the whole area can be effectively defended and protected. More than that. If Singapore were an enemy base, there is no other point from which any part of that great area could be protected. It is also the only station on the way to Australia and New Zealand by which the fleet can move to their help. You cannot steam a fleet either from the Panama Canal or the Cape across to Australia and New Zealand. The only route by which help can come to the Southern Dominions is by way of Singapore. Once the fleet is at Singapore it already covers the approaches to these Dominions, and is in the best position to provide them with security.

When the Singapore project was first discussed in Parliament it was attacked on three grounds; that it was a violation of the spirit of the Washington agreement; that it was an aggressive act against Japan; and that it would involve unwarranted and ever-increasing expenditures.

To the first complaint even Mr. Ramsay MacDonald, who was one of the strongest opponents of the Singapore project, took exception in no uncertain terms. Like Lord Balfour, who directed the British negotiations at the Washington conference, he pointed out that at that conference the boundary of the area delimited in the treaty as that in which fortifications were not to be strengthened was fixed at 110 degrees, and that Singapore, lying outside the boundary, was knowingly and expressly excepted from the agreement. This was understood at the time by the public as well as by the American, Japanese, and other naval experts. The charge that the base violated the spirit of the Washington conference may therefore be dismissed as specious.

To the second criticism the defenders of the base pointed out that Singapore is very nearly as far from Japan as England is from the United States. This is too great a distance for a modern fleet to operate successfully in an aggressive action against a strong fleet in its home waters. Furthermore, they pointed out that at the Washington conference Great Britain had forfeited the right further to fortify Hongkong, and that the withdrawal on Singapore was, in fact, removing their Far Eastern base 1,500 miles farther from Japan. Finally, rather than establish a new point of attack on the Island Empire, they insisted that Singapore was not directed "against" any nation any more than is Gibraltar or Malta.

To the third charge—that the base would entail increasing expenses—no adequate replies were made in the Parliamentary discussions. But it is interesting to note that the contract awarded in September 1928 for completion of the base called for an expenditure of only £7,750,000 instead of £10,500,000 as originally demanded.

Even today many Englishmen fail to appreciate the implication of the argument so ably put forward by Mr. Amery and others in Parliament—that Singapore is an imperial, rather than a merely English, base. In fact, the pressure for the construction of Singapore came largely from the Pacific dominions and colonies. At the various Imperial Conferences the Australian and New Zealand Prime Ministers, supported by Newfoundland and on occasions by Canada, urged the creation of the base so that they might benefit from the protection of the British defense system. In order to show its earnestness, New Zealand contributed a sum of £1,000,000 and the crown colony of Hongkong £25,000. The Federated Malay States donated the land for the base and additional sums. Australia preferred to put her contribution into ships, but her officials never ceased demanding that the base be completed as rapidly as possible. When the Ramsay MacDonald government decided to halt work on the base in 1924, many people in the Dominions felt that England had betrayed them and, to use the words of the then Australian Prime Minister, that "incalculable harm" was done to the empire's prestige.

The British Empire has not been alone in supporting this project. In the Dutch East Indies it has been hailed with enthusiasm and relief. Holland possesses in her tropical islands one of the richest treasure stores in the world. Not only is their present agricultural yield enormous, and their production of oil an important item in the world's supply, but they contain vast scantily populated areas which promise to be as rich as Java when commensurately developed. This empire is unprotected. Holland's few cruisers in the Dutch East Indies, based on a small naval depot at Soerabaya, would be unimportant against even a second-class naval power. The Dutch have long known that as a result of this they hold the islands only on the sufferance of their neighbors. Hence they are keenly anxious to see the balance of power preserved in the Pacific. They realize that with a strong British fleet based on Singapore, Britain's interests, which, like those of Holland, are determined by the necessity of upholding at Singapore, Great Britain could never permit the occupation of any of the Dutch islands surrounding Singapore by a power other than Holland. It would not be surprising, therefore, to learn that the already closely interlocked Dutch and British oil interests are factors in the Singapore situation. No agreement has ever been published, but that an understanding of some sort exists is generally believed in the Orient.

The Americans in the Philippines look with just as friendly an eye on the Singapore base as do the Dutch because they, too care only about the preservation of the

status quo in the Pacific. They realize that the provisions of the Washington conference forbidding the strengthening of the existing island defenses, taken in connection with the distance of the islands from Hawaii, makes difficult their defense by the American Navy alone. Hence they place much faith in the close community of interests between the Americans, British, and Dutch in this section of the world as the best assurance of achieving the mutually desired peaceful goal.

The weakness of the Singapore base lies in the exigencies of European politics. The size of the fleet which Great Britain can base on Singapore, whether in peace or war, is determined by the demands of the European political situation. An example from history will make this plain. Prior to the German race for naval armament, Great Britain maintained a powerful fleet in Chinese waters, based on Hongkong. As the German fleet began to threaten the English fleet after 1908, it became necessary for the British to withdraw their Asiatic squadron upon the Mediterranean, and ultimately to make their principal concentration in the North Sea. While there is no imminent danger of a new threat from Germany alone, it is more than likely that if England were to become involved in a war in the Far East the enemy would seek to create a situation in Europe which would at least threaten England's lines of communications and so force the immobilization in European waters of an important part of the British Navy.

But this does not mean that Great Britain would be defenseless in the East. In a war which threatened the *status quo* in the Pacific she would not be likely to be fighting single handed. None of the powers in the Singapore area could view with impunity an attack on the possessions of one of the others in that region. Fortunately the likelihood of such an attack is at present infinitesimal. But it is the policy of the British Empire, if not of Holland or the United States, to run no risks in matters of defense and to prefer to make good-will doubly sure by preparing for all emergencies. It is not surprising, therefore, to find that despite the fact that England's financial contribution to the base was withheld during the premiership of Ramsay MacDonald, the work was carried on, thanks to funds from other portions of the empire, and that it is now assured of completion within a few years.

NOTES ON INTERNATIONAL AFFAIRS

From October 3 to November 3
Prepared by Professor Allan Westcott, U. S. Naval Academy

UNITED STATES AND LATIN AMERICA

Brazilian Revolution Successful.—The revolutionary movement which began on October 3 in various provinces of Brazil came to a successful issue after about three weeks' warfare. On the night of October 23-24 the greater part of the federal troops and naval forces at Rio Janeiro went over to the revolutionists, brought about the overthrow of President Washington Luiz, and set up a temporary government headed by a *junta* of army and naval officers. On October 24 Getulio Vargas, Governor of Rio Grande do Sul and head of the revolutionary party, was named provisional president and took over the government upon his arrival at the capital a few days later.

President Vargas was the defeated Liberal candidate in the presidential elections of last March, in which Dr. Julio Prestes was declared elected by a majority of about 400,000, and would have taken office on November 15. Dissatisfaction with the outcome of the elections, which meant the continuance in power of the Sao Paulo political group headed by Luiz, was increased after the assassination last July of Joao Passoa, the Liberal candidate for vice president. Among the more basic causes for the revolution, however, may be counted the hard times in Brazil due to over-production of coffee, and the feeling that the recent coffee valorization loan was designed to benefit the rich coffee-raising districts at the expense of the other provinces. Over 27,000,000 bags of coffee were held in Brazil as a hang-over from last year, and this year's crop amounted to 24,000,000 bags, whereas the average yearly export is only about 15,000,000. For years there has been increasing dissatisfaction in the cattle-raising provinces against the continued domination of Brazilian politics by a group of leaders from Sao Paulo, the richest Brazilian state and center of the coffee-growing industry. This group was headed by President Luiz, whose policies would have been continued by his follower, President-elect Julio Prestes. Against this same faction was directed the unsuccessful revolt of 1924. Though long planned for, the present uprising was undoubtedly hastened by the revolutions in Bolivia, Peru, and Argentina.

The revolution began simultaneously in the southern provinces of Rio Grande do Sul, Parana, and Santa Catharina, in the central province of Minas Geraes, and in the more northern provinces of Parahyba and Pernambuco, all of which raised armies which engaged the federal troops and started a general movement toward the federal capital. There were serious defections from the government forces, and the conflict ended suddenly when the federal troops at Rio Janeiro went over to the revolution.

Attitude of United States.—Despite reports from London that the British government would accord early recognition to the new régime in Brazil, authorities in the American State department indicated that recognition on the part of the United States would be withheld until the new government gave evidence that it was established on a firm basis. Hardly a week before the overthrow of President Luiz, the Washington State department had authorized the sale of airplanes and munitions to the established Brazilian government, while an embargo was placed on shipments to the

revolutionary forces. Although Secretary Stimson took pains to justify this action as in accord with well-established international law and in accord also with our policy during the revolt of 1929 in Mexico, some fear was felt lest this backing of the wrong horse might result in injury to American trade and friendly relations with Brazil under its new rule. American exports to Brazil amount to about $115,000,000 annually, and imports from Brazil amount to $220,000,000, chiefly coffee.

CUBAN ELECTIONS.—Following alleged communist plots and disturbances, President Machado, of Cuba, on October 4, secured from the Cuban Congress an act suspending constitutional guaranties and putting the country under dictatorial rule until after the congressional elections, set for November 1.

ARGENTINE TRADE.—While British trade with South America is thought to have gained some advantage from the change of political power in Brazil, the Argentine revolution appears to have had an opposite effect, the violent anti-American policy in Argentina ending with the overthrow of Irigoyen. It is reported that the British-Argentine trade agreement negotiated by Viscount D'Abernon will now be allowed to lapse without ratification by the Argentine Senate, and with it the arrangement for purchase of $40,000,000 of railway equipment from British firms. It will remain to be seen whether a recovery of British hold on trade with the southern republic will follow the coming British trade exhibition and the prospective visit of the Prince of Wales.

GREAT BRITAIN

IMPERIAL CONFERENCE.—The Imperial Conference of premiers from the states composing the British Commonwealth of Nations met in London on October 1 for a month or six-week session, the paramount aim of which was to arrive at some arrangement on exchange of goods within the empire which would prove mutually beneficial and tighten the economic bonds of union. From the first it was evident that the idea of imperial free trade, so loudly shouted for by the Beaverbrook-Rothermere faction of the Tory party in England, was quite unacceptable to the dominions, who were interested in their own infant industries and were not open to purely sentimental appeals. The extent to which the dominions would go was clearly indicated by the proposal of Prime Minister Bennett of Canada, who stated that his country was willing to establish preferential tariffs in certain classes of British manufactured goods in return for one thing—a British preferential tariff favoring dominion wheat. But the policy of a tax on wheat was one which no British party—Conservative or Labor—was willing to base a popular appeal. In the Labor government the idea was killed by that most uncompromising of free traders, Philip Snowden, and Premier MacDonald put before the conference instead a complicated scheme (borrowed from the Conservatives) for bulk purchases through import boards, and a system of quotas by which England would definitely pledge herself to increased imports of dominion goods. During the past five years 47.4 per cent of wheat imports to the United Kingdom have come from the dominions, and the latter hope to have this increased to 55 per cent. At the close of the month it appeared certain that the conference was "petering out," and that any trade arrangements made would be of very limited scope.

EMPIRE TRIBUNAL.—While the Imperial Conference struggled vainly with economic problems, definite progress was made in the easier task of setting up an empire tribunal, for suits between the states making up the empire. Nor is the home government likely to insist on retention of the traditional power of the British Privy Council to consider appeals from the supreme courts of the dominions. The Irish Free State cut this constitutional knot by simply passing an act forbidding such appeals, and this may be accepted as an easy way of settling the matter.

PALESTINE POLICY.—Hot antagonism was aroused throughout the Jewish world by the new policy—or possibly only a very badly phrased restatement of the old policy—of the British government in Palestine, as announced in a white paper accompanying the Simpson Report on conditions in the protectorate. The new policy aims at some regulation and restriction of Jewish immigration

and land purchases, in order to safeguard the welfare of the Arab population, which numbers about 700,000 as compared with the present Jewish population of 140,000. The British also plan a legislative body of 23 members, 12 of whom are to be elective. Protests against the policy declared it a violation of the Balfour Declaration of 1917 establishing the Holy Land as a Jewish national home—a declaration which, as General Smuts pointed out in a note to the government, was an international document and could not be disregarded without the consent of the former allied powers.

NEW CONSTITUTION IN EGYPT.—On October 23 a revised constitution and new electoral law was promulgated in Egypt, without arousing serious disturbances. The new constitution reduces the size of both houses of parliament and greatly increases the royal power, while the new electoral law abolishes direct elections, imposing a two-degree system in its place.

REDUCTION OF ARMAMENTS

RATIFICATION OF NAVAL TREATY.—Ceremonies accompanying the ratification of the London Naval Treaty were held at the British Foreign Office, London, on October 27, those taking part including Ambassador Dawes representing the United States, Ambassador Matsudaira of Japan, Prime Minister MacDonald, and the premiers of the British dominions who were in London for the Imperial Conference. The French and Italian ambassadors were present, but of course did not affix their signatures. Speeches over an international radio hook-up were made by Prime Minister Hamaguchi of Japan, President Hoover, and Prime Minister MacDonald. Hopes were expressed for settlement of the naval dispute between France and Italy, still deadlocked over Italy's demand for recognition of the principle of naval parity with France.

MEETING OF ARMS COMMITTEE.—Judging from the problems to come before the meeting of the Preparatory Committee for a Disarmament Conference, set for November 6 at Geneva, the committee is likely to be occupied for a period of six or eight weeks, if it fulfills the hope of completing a draft convention in this session. About fifteen major points remain to be settled, relating to aviation, limitation of war budgets, and other issues in which the committee has made little previous headway.

After consultations in Washington the American representative on the committee, Ambassador Hugh Gibson, returned to Europe, where he visited both Paris and Rome in a final effort to mediate in the Franco-Italian naval *impasse*, the greatest present obstacle in the way of a general agreement on arms limitation.

GERMANY

CHANCELLOR WINS IN REICHSTAG.—In the new German Reichstag which met for a brief session, October 13-19, Chancellor Bruening secured without great difficulty a vote of confidence of 318 to 236, together with approval of the government's $125,000,000 international credit bill and a 20 per cent cut in the pay of Reichstag members, a part of the Chancellor's general scheme of financial retrenchment. The government victory was made possible by the solid support of the 143 votes of the Socialist party.

The opening of the parliament was preceded by a Fascist celebration in the Tiergarten and also by a window-smashing anti-Jewish riot in the shopping districts of Berlin, for which the Fascists denied responsibility. At the opening of the Reichstag the 107 Hittlerite deputies marched into the hall in their Fascist uniform of brown shirts and tan riding breeches, and the spokesman of the party laid down their demands for abrogation of the Versailles treaty, revision of the Young Plan, restoration of universal military service, and peace if possible but war if necessary to achieve German "independence and social liberation."

GERMAN FINANCES.—In his speech before the Reichstag on October 16 Chancellor Bruening did not explicity state that Germany would call for the emergency moratorium provided in the Young Plan, but he pointed out that Germany's ability to pay depended on the expansion of her foreign commerce and the stability of world finance, whereas the economic situation both in Germany and abroad had grown steadily worse from month to month. At the close of October several resolutions calling for

immediate stoppage of reparations payments were defeated in the Foreign Relations Committee of the Reichstag, leaving the government free to carry forward its fiscal plans, both foreign and domestic, without interference for the present. An ultimate halt of reparations payments and a defiance of the disarmament provisions of the Versailles treaty by "some German government" was freely predicted by Dr. Hjalmar Schacht in speeches in America, unless Germany were assisted to extend her foreign trade, and unless the ex-allied powers carried out their own disarmament pledges.

Despite the certainty of a budget deficit, there is some encouragement for Germany in the fact that for the first time in four years her commerce shows a favorable balance of a billion marks, the exports for the nine months ended September 30 amounting to 9,100,000,000 marks, and the imports to 8,100,000,000.

SOUTHEASTERN EUROPE

New Rumanian Cabinet.—The Peasant Party Government in Rumania under Premier Juliu Maniu, which had been in power since November, 1928, save for a brief intermission at the time of King Carol's restoration, went out of office in early October, its downfall being attributed to intrigues within the party and also to Dr. Maniu's persistent opposition to the king's coronation unless preceded by a reconciliation with Queen Helen. After vain efforts to secure a coalition cabinet, the king was forced to accept another Peasant Party ministry with Prof. George Mironescu as prime minister. The real power behind the new government is said to be the well-known Rumanian Minister to London, Nicolai Titulescu, who has been busy with negotiations for a large British loan to Rumania, and who, if these arrangements are completed, may return to take over the premiership.

Bulgarian King Weds Princess Giovanna.—The marriage of Czar Boris III of Bulgaria to the Princess Giovanna, daughter of the King of Italy, took place on October 25 at the Church of St. Francis, Assisi, Italy. After the wedding the royal couple made the journey to the Bulgarian capital by yacht through the Aegean and Black Seas. The possible political significance of the union lies in its linking-up of Bulgaria with Albania and Hungary among the pro-Italian states of the Balkans.

SOVIET REPUBLIC

Failure of Sino-Soviet Parley.—Conferences between Soviet and Chinese representatives for a final settlement of the Chinese Eastern Railway dispute were renewed at Moscow on October 12, but ended later in the month without bringing the Chinese delegates closer to ratification of the tentative agreement which was signed at Khabarovsk last December. During the intervening period, it is said, Dictator Chang Hsueh-liang of Manchuria has permitted a reorganization of White Russian bands in Northern Manchuria for raids on Soviet territory and interference with the operations of the Eastern Railway. Following the breakdown of negotiations at Moscow, Soviet concentration of troops was also reported on the Manchurian border, which again became the scene of raids and demonstrations such as preceded the hostilities of last year.

Progress of Five-Year Program.—In an article by John Carter in the October *Scribner's,* entitled "Russia's Challenge to American Business," the author summarizes the basic objectives of the Soviet Five-Year Industrial Plan (precursor of a fifteen-year plan now being elaborated), as an increase of basic capital from 7 to 16 billion rubles, of industrial output from 18 to 43 billion, and of national income from 24 to 50 billion. At the close of its second year in October, this program was only slightly below schedule, while the aims were greatly exceeded in the expansion of collective farming. The 1930 cotton crop showed an increase of 60 per cent, and the sugar beet crop an increase of 150 per cent. The national income of 1930 increased to 33 billion rubles (about $16,500,000,000). Russian industrial exports in 1928-29 increased 28.4 per cent over the year before. In the first four months of 1930 American exports to Russia amounted to over $54,000,000, as compared with $17,000,000 during the same months last year.

Mr. Carter concludes his article as follows:

Russia is making itself over, with the aid of American business, and if Russia makes a success

of its Five-Year Plan and is thereby enabled to compete industrially with the nations of the West, it will be largely because of the American equipment, the American brains and the American methods which have been put at the disposal of the greatest collectivist experiment in history.

The implications of this for American business are enormous. Whether the Russian experiment succeeds or fails, that technic of industrial common-sense which is called "Americanization" will have conquered the greater part of a continent. The effect should be to give the United States a strong lead in the Russian market for the next generation. At the same time, Russia is detaching herself from her pre-war position of economic subservience to Europe. Russia will no longer figure as an exclusive market for British and German wares and a convenient source of cheap raw materials for European industry. Aside from foodstuffs, Russia will tend to manufacture her own raw materials into industrial products. Today, Russian pulp wood can be sold in New Hampshire in competition with Canadian wood pulp and hence decreases our dependence on the Canadian producers.

In one sense, therefore, American business stands to gain significantly from Russian economic independence. In another sense, a success of Russian collectivism will confront American business with the greatest challenge of its history. We have been so free with our prophecies that communism won't work that we have never stopped to consider what we shall do if communism does work. Shall we indorse it and turn communist, in that event? Hardly. Shall we imitate it? Possibly, here and there, particularly in the field of coördination. Shall we compete with it? How?

Naturally, none of these questions will arise if communism makes a failure of its Big Business. Shall we gamble on its making such a failure? Not if we have any foresight.

The problem of Russian competition, with all the political complications inseparable from a governmental control of business, will be a major consideration for the next generation of business men. We may be able to ignore it for two, three, or five years, but some time and somehow we shall have to face the possibility that we have guessed wrong about Russia.

FAR EAST

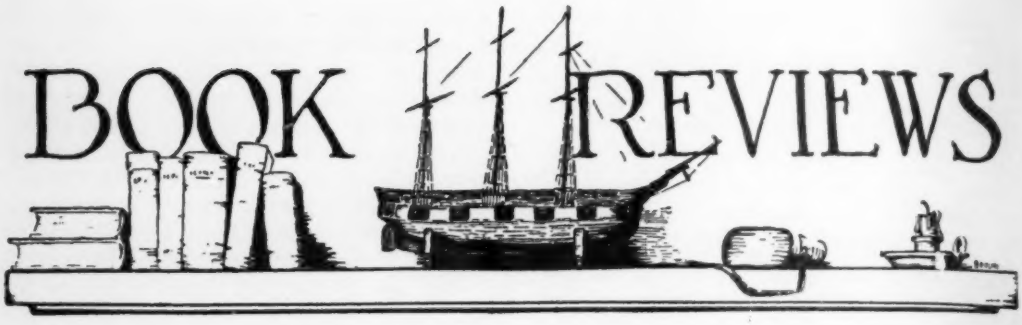
Collapse of Northern Rebellion.—The final defeat of the Northern rebellion in China, with the retreat of remnants of General Feng Yu-Hsiang's forces toward Shanshi province, was reported in early October. Many of Feng's troops were taken over and reorganized under leaders now professing loyalty to Nanking. Train service between Nanking and Tientsin was reopened on October 8. The presence of a Manchurian Army south of the Great Wall remained, however, as a disturbing factor in Chinese politics, despite the nominal loyalty of the Manchurian dictator Chang Hsueh-liang to the Nanking government, and his statement on October 24 that he would withdraw his Army rather than engage in hostilities with Nanking. There would be little surprise if by next spring General Feng's easily shifting allegiance would be found on the side of the Southern leaders in an effort to oust Chang from his domination of the Peking area.

Chiang Adopts Christianity.—During his stay at Shanghai in October President Chiang Kai-shek definitely embraced the Christian faith and was baptized in the Methodist Church by an American missionary. The President's wife and other members of the Soong family have long been Christian.

War on Red Banditry.—With the release of troops by the downfall of the rebellion in the North, the Nanking government took some measures to cope with the reign of wholesale banditry which has prevailed in Kiangsi, Hunan, and other south-central provinces. Among the more violent bandit outrages was the capture and holding for ransom of a considerable number of Catholic priests and nuns when the city of Kian, Kiangsi province, was looted on October 5.

Attacks on foreign shipping and naval patrol boats continued on the upper Yangtze. On October 26 the U.S.S. *Luzon* was fired on by shore batteries below Chengling, which were silenced by seven 3-inch shells and 390 rounds from machine guns. Chinese gunboats were sent above Hankow in an effort to relieve the constant menace to commerce in the river.

BOOK REVIEWS



BOOK DEPARTMENT

Members of the Institute may save money by ordering books through its Book Department, which will supply any obtainable book. A discount of 10 per cent is allowed on books published by the Institute, and 5 per cent on books of other publishers (government publications excepted). Address Secretary-Treasurer, U. S. Naval Institute, Annapolis, Maryland.

COME ON, *TEXAS*. By Paul Schubert. New York: Jonathan Cape and Harrison Smith, Inc., 1930. $3.00.

REVIEWED BY LIEUTENANT COMMANDER C. H. MCMORRIS, *U. S. Navy*

Come on, "Texas," the rallying cry of the flagship of the fleet, is the title that Paul Schubert has taken for a biography of that well-known battleship. The story he has "put into the mouth of a naval petty officer —your petty officer is closest to a ship's fiber; he works her with his hands, is officer-like in responsibility, yet one with those all-important personages, the non-rated sailors of the lower decks." It requires a seaman, and one who has known and loved his ship intimately and well, to picture it with that sentient something which marks it as an entity of itself.

The reader learns and understands something of men's pride in ships. He soon appreciates that love which a true sailorman has for *his* ship. The love that Conrad says is so profoundly different from that which men feel for every other work of their hands; because the pride of skill, the pride of responsibility, the pride of endurance, the pride of accomplishment, all are untainted by the pride of possession. But especially does the author tell us of the *Texas*. As one reads one sees "the 'name' of the ship slowly established, her fame made for her, the tale of her qualities and of her defects kept, her idiosyncrasies commented upon with the zest of personal gossip, her achievements made much of, her faults glossed over. All those things make up her 'name' and are handed over from one crew to another with the feeling of close association in the exercise of her perfections."

This is such an interesting account of life on a battleship—tales of courage, hardihood, endurance, loyalty—that one wishes that certain portions might have been modified. Some readers will be indignant at the frequent and apparently unnecessary profanity and frankness of speech. Many a Navy man will resent the picture that is drawn of the fleet in the years immediately following the war, and will feel that the bluejacket of that period is not depicted in his true light. These faults, if such they may be, may have arisen from the author's earnest endeavor to give a true and colorful narrative. If so, perhaps in anxiety to produce a vivid picture, some features may have been so overstressed that he became a victim of his own exaggeration and lost something of that note of sincerity which, in general, characterizes the story.

Nonetheless, the book is one that will hold attention from the beginning. The accomplishments of the *Texas* are told in the language of the man-of-war's man; a speech that is clear and vigorous, albeit at times crude if not vulgar. Though the book will be appreciated most by those who have served at sea, yet the landsmen too will enjoy its picturesqueness, its freshness; and will welcome it as an addition to his collection of sea stories.

THIRTY FATHOMS DEEP. By Commander Edward Ellsberg. New York: Dodd, Mead & Co. Inc., 1930. $2.00.

REVIEWED BY LIEUTENANT N. W. GOKEY, *(C.C.), U. S. Navy*

This book tells the story of a successful salvage expedition after sunken treasure off the coast of Peru. While purely fiction, a great deal of reality is woven into the story by the use of well-chosen names which ring especially true and by frequent allusions to the salvage of the submarines *S-51* and *S-4*. The universal appeal of the subject and the application of Navy organization and modern diving methods to the problem of recovering lost treasure should make this book of special interest and entertainment to Navy personnel.

In addition to the better known perils and possibilities of diving, several new ones, not too fantastic, have been introduced, including the rescue of one diver with a severed air hose by the resourcefulness of his fellow diver, the drinking of old Spanish wine by another while on the bottom to the perplexity of the skipper, and the sinking of the modern pirate ship by burning a hole in her bottom with an underwater cutting torch. These and other experiences, full of action, maintain one's interest in the story from beginning to end.

Although the author, who is an acknowledged authority on diving and salvage, has plainly written this book in an effort to produce a "best seller," it will undoubtedly do much to better acquaint the general public with the difficulties and dangers of deep-sea diving as well as with the personality, courage, and loyalty of the average Navy diver which the author understands so well.

SETH HARDING, MARINER, A NAVAL PICTURE OF THE REVOLUTION. By James L. Howard, New Haven: Yale University Press. 1930. $3.00.

REVIEWED BY PROFESSOR ALLAN WESTCOTT, *U. S. Naval Academy*

Seth Harding was one of about forty-five captains in the Continental Navy during the American Revolution. A skipper out of Connecticut ports, his first war-time cruise was in the Connecticut brig *Defence*, in which, on June 16, 1776, in Boston Bay, he captured the British armed transport, *George* after an hour and a half of sharp fighting, and next morning two other transports, with 464 troops and valuable military stores. This was probably his most notable exploit. Next year he commanded the Connecticut ship *Oliver Cromwell* (twenty guns), in which he took several prizes, including the sloop-of-war *Weymouth* (eighteen guns). In 1778, through the influence of Governor Trumbull, he was commissioned by the Continental Congress captain of the new frigate *Confederacy* (twenty-two guns), and, putting to sea in her in the following summer, he aided Captain Tucker of the *Boston* in the capture of the frigate *Pole*. In October, 1779, the *Confederacy* sailed for Europe with the French Minister Gerard and John Jay, our own Minister to Spain, but she lost her spars in a gale and after two months at sea finally reached Martinique under jury rig. After refitting his ship there and returning to Philadelphia, Harding was kept many months in port through difficulties in securing a crew—even when, as seems to have been common in our own service of that day, resort was made to impressment. At last he got to sea for a West Indian cruise, in the winter and spring of 1781, but on his return was captured off the Delaware Capes by two British frigates. His last war service was in the letter-of-marque *Diana*, in which he was again captured by an enemy man-of-war. Quickly exchanged at Jamaica, he went to Cape François and there took service as an officer under Barry in the *Alliance*, in which he participated, March 8, 1783, in an indecisive action with three British vessels, the last sea fight of the Revolution.

After the war Harding was at one time in jail for debt, and then after five years more of seafaring he was reduced to keeping a boarding house in New York. Tardy recognition of his claims against the government came at last in 1807 when he was granted a half-pay pension. He died at Schoharie, New York, in 1814.

Most of this Revolutionary skipper's war-time accomplishments are in the histories; but we are indebted to Mr. Howard for much new material from manuscript sources, and for a thorough search of other records, both in manuscript and in print, which has enabled him to give a fairly complete account of Harding's career. There

is some trace of amateurishness in the presentation of this material. Mr. Howard's idea of telling the story like a historical novel, with imaginary dialogues, etc., is not altogether a happy one; and we should prefer a clear, scholarly account of the manuscript material, its origin, and present location. These, however, are but minor defects in a noteworthy contribution to the naval history of our first war.

Reviewed by Instructor Richard S. West, Jr., *U. S. Naval Academy*

A large percentage of the American colonists were seafaring people. For the most part they lived along the Atlantic coast and on the shores of its bays and rivers. Transportation and communication were largely carried on by water, as in the mother country. Great Britain, moreover, had encouraged the colonists during the French and Indian War in the semi-warlike activity of privateering. It was no wonder, then, that American colonials outraged by the policy of George III should stage tea parties not only in Boston Harbor but all along the seacoast. Gradually we are acquiring more complete information relating to the lesser naval officers and the privateers of the Revolution, whose deeds are sketchily recorded.

Yale University has just published an interesting little book, *Seth Harding, Mariner. A Naval Picture of the Revolution,* by James L. Howard, a book which actually fulfills the promise of its subtitle, presents an interesting, completely documented history of one of the colorful minor sea warriors of the Revolution.

When the dispute with the mother country passed the stage of oratory in 1775, Seth Harding applied to Governor Jonathan Trumbull for a command in the provincial Navy which the "Rebel Governor of Connecticut" was organizing. He was given a brigantine, almost new, which had been recently purchased. Harding installed sixteen 6-pounders and twenty-four swivels aboard the *Lilly Ann,* now rechristened the *Defence,* and set to work first in Long Island Sound. British sympathizers were numerous in southwestern Connecticut, and it must be admitted, "a not inconsiderable number was in enthusiastic accord with the side which happened to be on top locally for the time being." These Tories, in addition to other aid to the enemy were privateering most wickedly against the shipping of their rebel neighbors. Harding helped to round up some thirty-six conspirators for the Connecticut government.

In the early summer of 1776 it was Harding's good fortune to capture three transports bringing Highlanders to assist in quelling the rebellion in New England. Prize money, unfortunately, was not received by Harding and his men; the Continental agent at just this time became insolvent. This was a severe blow to morale for rewards for the ordinary seamen were considerably greater in privateering than in one of the provincial navies or in the Continental Navy.

Harding was now given a larger and more speedy vessel, the *Oliver Cromwell,* in which he steered southward toward the Azores. In rapid succession he captured five vessels, averaging perhaps ten guns each, and sent them home to New London. His prisoners of war placed an unusual but not unwelcome tax on the capacity of Norwich jail. Harding then made a successful journey on a cartel ship, exchanging his prisoners for Colonial seamen.

A little later Harding did some energetic lobbying and obtained command of the frigate *Confederacy* then under construction at Norwich, Connecticut. Once he got an opportunity to try his fortune in European waters. He set out from Delaware Bay carrying official passengers, John Jay and the French Minister Gerard. Midway in the Atlantic, however, his evil nemesis overtook him. A sudden squall denuded the *Confederacy* of masts, spars, and even the bowsprit, and crippled the rudder. He shifted course then to Martinique, where he arrived in safety, but without much chance to refit owing to the watchfulness of the British. He returned to Philadelphia, installed new masts and rigging, and put to sea only to be captured by an overwhelming force of blockaders. Mr. Howard's life of Seth Harding presents a pleasingly graphic picture of general conditions during the Revolutionary era. To readers who desire well-substantiated facts his book should prove very acceptable.

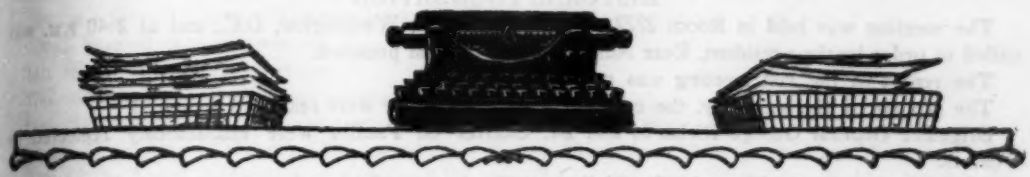
Courtesy Bureau Construction and Repair, Navy Department

U.S.S. INDIANA

Photograph by Hollinger

REAR ADMIRAL HENRY C. TAYLOR, U. S. NAVY
In command of the battleship *Indiana* during the Spanish-American War

SECRETARY'S NOTES



Rear Admiral Henry C. Taylor

Professor Herman F. Krafft has prepared the following sketch of the Naval Institute's eleventh president.

Henry Clay Taylor was born in Washington, D.C., March 4, 1845, the day that James K. Polk was inaugurated as President of the United States. Polk had won out over his distinguished opponent, Henry Clay, after whom the elder Taylor, a close personal friend, named his newborn son. Taylor graduated from the Naval Academy in 1863, and as an ensign he at once took an active part in the Civil War, attached to the steam sloop *Shenandoah* of the North Atlantic Blockading Squadron.

After the war Taylor saw the usual variety of service ashore and afloat that falls to the lot of the average naval officer. He spent a two years' leave, in 1888-90, as vice president and general manager of a company interested in building a canal through Nicaragua. In 1894 Captain Taylor became President of the War College at Newport—a job for which he had unusual aptitude.

In the Spanish-American War Taylor, in command of the *Indiana,* took part in the bombardment of San Juan, Porto Rico, and in the sweepings of Admiral Sampson's squadron through Cuban waters during the interval before Cervera's cruisers were definitely located in Santiago Harbor. The *Indiana* convoyed General Shafter's transports, and bombarded the shore batteries on June 22 and on July 2. On the following day Captain Taylor played an important rôle in the battle of Santiago.

Among other details after the war Taylor, now a rear admiral, had command of the North Atlantic Squadron. From October, 1902, until his death July 26, 1904, Admiral Taylor was president of the Naval Institute. As man and officer he was greatly respected for his fine character. His hobby was the higher education of officers.

Picture of the assassin of President Borda

An interesting picture is shown in plate XLVIII of this issue in connection with the article by Constance Lathrop on the revolution in Uruguay in 1897, which was published last month. It is regretted that it was not practicable to include the picture with the article.

President Borda, carrying a cane, and with his hat raised, is in the left lower foreground. A short distance behind him is the American Minister, Granville Stuart, who has a full beard, and who is wearing a silk hat. The Archbishop, who is in front of the Minister, is partially obscured by Herera Y. Obes; the latter, with an overcoat across his arm, is looking toward the President. The assassin, indicated by the circle, is near the door to the left.

The fatal shot was fired at almost the very instant that the picture was taken.

Naval Historical Foundation

The following information regarding the Naval Historical Foundation's activities during the past year has been received from the secretary of that organization:

MINUTES OF ANNUAL MEETING OF MEMBERS OF THE NAVAL HISTORAL FOUNDATION

The meeting was held in Room 2727, Navy Department, Washington, D.C., and at 2:40 P.M. was called to order by the president, Rear Admiral Rodgers, who presided.

The report of the last meeting was read and approved.

The reports of the secretary, the curator, and the treasurer were read and approved.

Brigadier General George Richards and Dr. Charles O. Paullin were unanimously reëlected as trustees.

The question of acquiring the La Vallette collection was discussed, and on motion duly seconded it was resolved to be the sense of the meeting that the collection was worth about three hundred dollars, as appraised, and that the executive committee was authorized to negotiate and arrange for its purchase.

On motion duly seconded, it was voted that the treasurer be directed to transfer fifteen hundred dollars ($1,500) from the checking account to the trust fund.

After discussion of the proposed naval museum, and no further business coming up for consideration, the meeting was adjourned at 3:15 P.M.

D. W. KNOX
Secretary

REPORT OF THE SECRETARY

November 7, 1930.

Since the last annual meeting the following new members have joined the foundation:

Secretary of the Navy Charles Francis Adams
Charles Bittinger
Captain H. C. Cocke
Captain J. F. Carter
Mrs. Lowry Gillett
H. A. Gillis
Captain C. H. Harlow
N. M. Hubbard
James L. Howard
Assistant Secretary of the Navy David S. Ingalls
Captain A. W. Johnson
Assistant Secretary of the Navy Ernest Lee Jahncke
Lincoln King
Albert S. Long
Commander Claude B. Mayo
Captain C. F. Macklin
Richard C. McKay
Senator Tasker L. Oddie
Miss Annie H. Parke
E. C. Plummer
Charles Mason Remey
Rear Admiral D. F. Sellers
Captain W. D. Sharp
Mrs. George S. Selfridge
Charles Thorburn
Charles H. Taylor

At the last meeting the following trustees were unanimously reëlected for three years: Rear Admiral W. L. Rodgers, Dr. J. Franklin Jameson, Rear Admiral Elliot Snow (C.C.) and Captain Dudley W. Knox.

It remains for this meeting to fill the vacancies on the board of trustees caused by the expiration of the term of office of Dr. Charles Oscar Paullin and Brigadier General Richards.

The special committee appointed to further the establishment of a National Maritime Museum in the city of Washington has continued its efforts along the line of coöperating with the Navy Department in its proposals to incorporate a naval museum in the design of the projected Navy Department building.

Steps have been taken to meet the obligation of the foundation to prepare and publish a history of the Revenue Cutter service, incurred in consequence of accepting the Remick legacy. The manuscript history written by the late Captain Horatio D. Smith, U.S.R.C.S., and obtained by Rear Admiral Elliot Snow, is now appearing serially in the Coast Guard magazine at the instance of the foundation. The publishers have agreed to produce a book, from reprints of the material, at the conclusion of the magazine series, and to handle all matters connected with copyright and marketing. The foundation has underwritten the first thousand copies to the extent of $350.

Following the appraisal of the manuscript collection of the late Rear Admiral La Vallette, by the Library of Congress, and the unwillingness of the owner to sell them, the papers have remained

in the possession of the foundation in the status of a loan. The owner now proposes that the foundation acquire the collection permanently by paying him a small annuity.

One of our new members, Miss Annie H. Parke, is a great granddaughter of Captain Matthew Parke of the marines, who served on board the *Alliance* with John Paul Jones. Miss Parke has informed the secretary that she has made provision for the ultimate delivery to the foundation of the following relics of Captain Matthew Parke:

Small framed coat of arms
His silver watch and fob chain
His metal spectacle case and spectacles
His silver snuff box containing a miniature of himself and his wife, Judith Sewall Cooper
Small oil painting of the ship *Alliance* entering Boston Harbor in 1780—painted by Matthew Parke.

The U. S. Naval Institute has continued its exceedingly generous donation of the interest on $10,000 at 5 per cent, voted by its members in 1927 for a period of five years. The secretary has received these payments quarterly and forwarded them to the treasurer.

D. W. KNOX

REPORT OF THE TREASURER

I respectfully submit the following report covering the period March 31, 1929-November 7, 1930:

Balance in the National Savings and Trust Company, subject to check, March 31, 1929	$1,650.45
Total sum deposited, March 31, 1929-November 7, 1930	1,426.33
Total	$3,076.78
Total sum withdrawn from checking account, March 31, 1929-November 7, 1930	1,068.30
Balance, checking account, November 7, 1930	$2,008.48

The following is an itemized statement of the sums deposited:

April 25, 1929	income from trust fund, October 15, 1928, to April 22, 1929	$ 62.17
April 27, 1929	check of the U. S. Naval Institute	125.00
June 19, 1929	check of the Curtis Publishing Co. in payment for infringement of copyright on Burnell Poole's picture "The Sixth Battle Squadron"	200.00
July 1, 1929	interest on checking account	13.44
August 17, 1929	check of U. S. Naval Institute	125.00
October 11, 1929	check of U. S. Naval Institute	125.00
October 19, 1929	income from trust fund, April 22 to October 15, 1929	52.78
January 1, 1930	interest on checking account	11.53
January 11, 1930	check of U. S. Naval Institute	125.00
March 10, 1930	donation by Society of Sponsors of the United States Navy	25.00
April 11, 1930	check of U. S. Naval Institute	125.00
April 21, 1930	income from trust fund, October 15, 1929, to April 17, 1930	85.74
July 1, 1930	interest on checking account	14.89
July 11, 1930	check of U. S. Naval Institute	125.00
October 15, 1930	check of U. S. Naval Institute	125.00
October 17, 1930	income from trust fund, April 17 to October 15, 1930	85.78
Total		$1,426.33

The following is an itemized statement of the sums checked out from the checking account:

April 12, 1929	to C. O. Paullin to pay for copyrighting Burnell Poole's painting entitled "A Critical Situation"	$ 1.00
May 21, 1929	to Trust Fund, National Savings and Trust Co.	1,000.00
July 26, 1929	to C. O. Paullin to pay for copyrighting Burnell Poole's painting entitled "A Distorted Target for U-Boats"	1.00
August 27, 1929	to National Savings and Trust Co. to pay for an American Navy Letterbook, captured in Washington, 1814	53.80
December 9, 1929	to P. R. Burke for photostat materials	5.00
October 1, 1930	to Sudwarth Printing Co. for postcards	7.50
Total		$1,068.30

The pecuniary resources (disregarding accrued interest) of the foundation on November 7, 1930, are as follows:

Trust Fund	$3,000.00
Balance, checking account	2,008.48
Total	$5,008.48

Respectfully submitted,

CHARLES O. PAULLIN
Treasurer

What articles do you wish? From time to time the editor receives comments and suggestions as to the make-up of the PROCEEDINGS. He would appreciate it if more members would take an active interest in the material published, and would let him know what articles or what types of articles are preferred, or what types of articles may be receiving too much space. The PROCEEDINGS are published for the members of the Institute. More good can be accomplished if those concerned would indicate what they want.

Index to Volume 56 It has been decided not to include the index to Volume 56 in the December issue, as has been the custom in the past. However, the index will be published separately in pamphlet form, and a copy will be sent to any member or subscriber without cost on request.

Membership The business of the Institute has progressed favorably during the year 1930 and has shown an increase in membership but not to the extent that is desired. It has been gratifying to note that members are nominating their friends for membership, and it is hoped that they will continue to make use of the nomination blanks which were enclosed with the due bills.

A chance to help The followng three pages show illustrations of fleet activties, reproduced from original etchings by Don Swann who accompanied the fleet to Guantanamo last spring through special permission of the Secretary of the Navy.

Mr. Swann has printed and signed a limited and numbered edition of two hundred artist proof copies for possible sale during the holiday season for the benefit of the Navy Relief fund.

The Institute can furnish these original etchings, matted and ready to frame, sizes and prices as stated below:

Subject	*Plate Size*	*Price*
"Guantanamo Bay"	6⅛" x 10"	$ 5.00
"U.S.S. *Mississippi*"	6¾" x 7¾"	4.00
"Navy Wings"	6" x 7¼"	3.00
"An Eaglet Rises"	5" x 7¼"	4.00
"The Big Guns Speak"	5½" x 7⅜"	3.00
"A Day's Work Done"	7½" x 9¼"	5.00
A complete set of the above six etchings		20.00

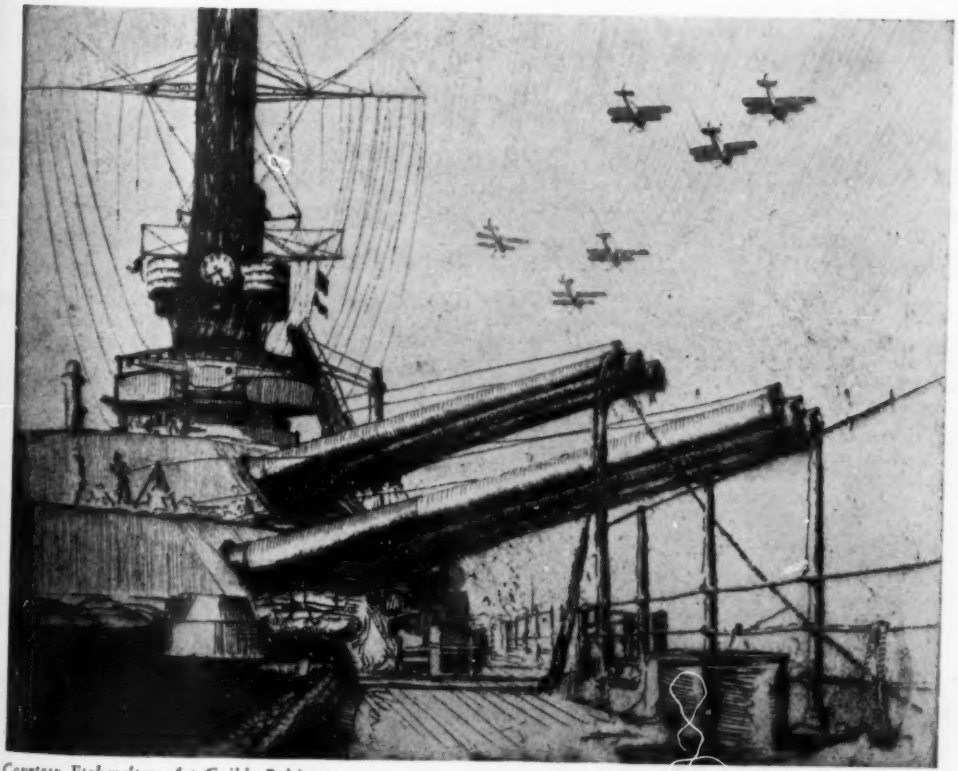
NOTE: Many people are in doubt as to how an original etching is made. Mr. Swann states that his method is as follows:

1. The sketch is made generally quite a bit larger than the etching.

2. A copper plate is covered with an acid resist and the sketch drawn through this protective coating. The plate is now dipped in successive acid baths until the lines are suitably bitten into the copper; or the sketch can be drawn directly onto the plate with a sharp instrument. The last is known as dry point and of the above subjects, "A Day's Work Done" is an example.

3. A print is made by carefully wiping ink into the lines on the plate and pressing dampened paper over the whole. Each print is a separate and distinct artistic effort. Owing to the delicacy of the line work, the plate soon wears out, therefore, only a limited edition can be made.

GUANTANAMO BAY

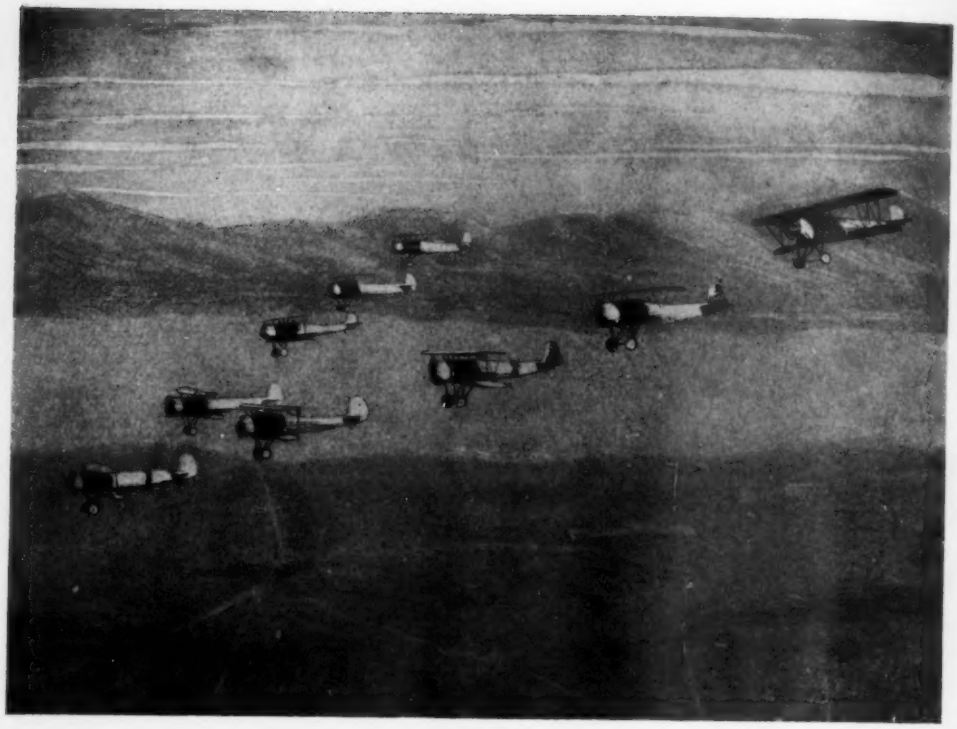


Courtesy Etchcrafters Art Guild, Baltimore.

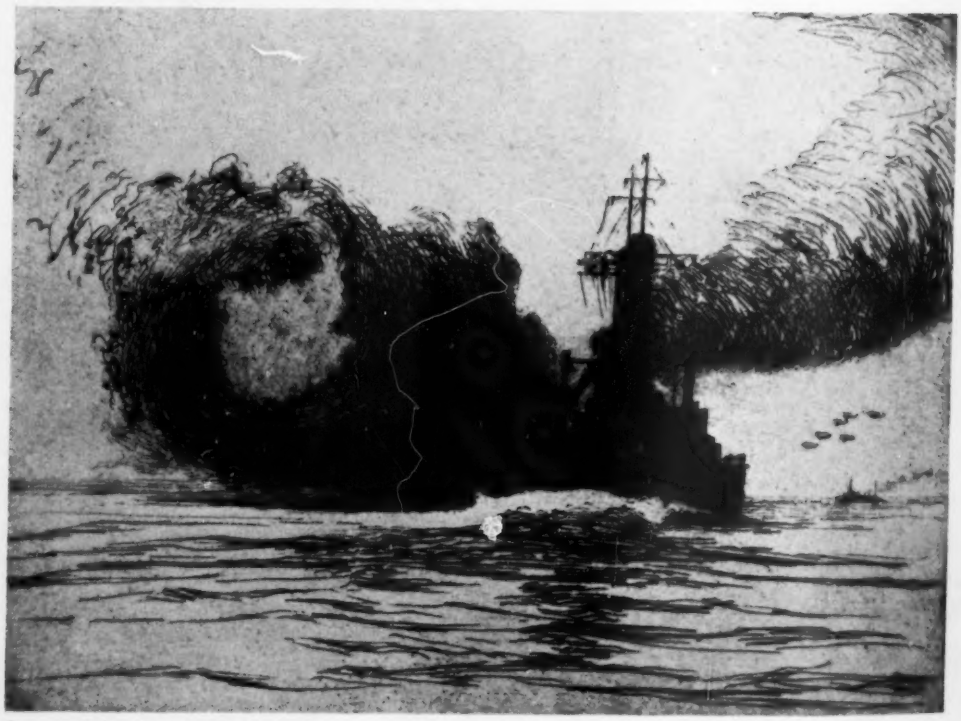
From an etching by Don Swann

U.S.S. *MISSISSIPPI*

UNIV. OF MICH.

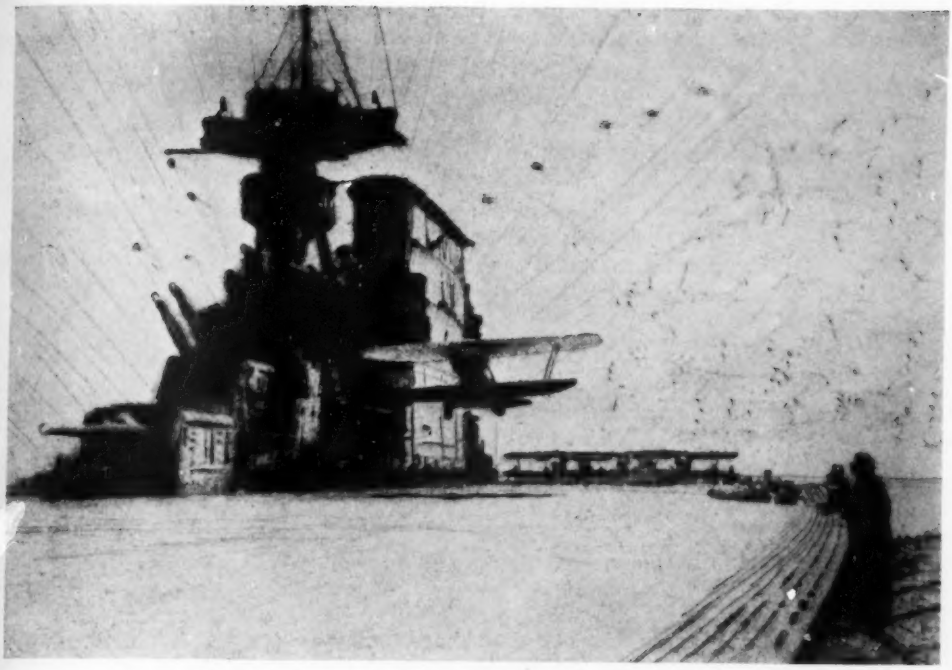


NAVY "WINGS"

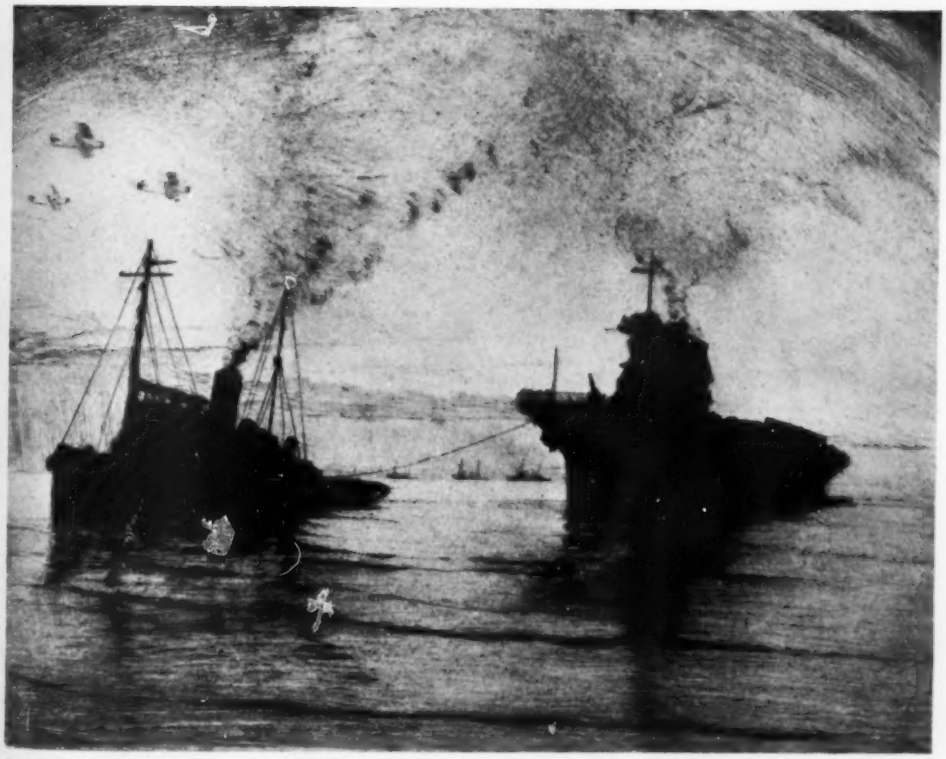


Courtesy Etchcrafters Art Guild, Baltimore. *From an etching by Don Swann*

THE BIG GUN SPEAKS



AN EAGLET RISES



Courtesy Etchcrafters Art Guild, Baltimore *From an etching by Don Swann*

A DAY'S WORK DONE

UNIV. OF MICH.

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How to become an Associate Member—The regular subscription rates to the PROCEEDINGS are $5.00 per year. You are eligible to become an Associate Member if you are "interested in the objects of the Institute" and are an American citizen of good standing and character in your community (write Secretary for further information as to details). The annual dues, $3.00, are the same as paid for regular membership by officers of the U. S. Navy, Marine Corps and Coast Guard, and entitle you to receive each month at no additional cost our magazine. Reserve officers of all branches of U.S. services are eligible for Associate Membership.

The pages of the PROCEEDINGS, of which this issue is a fair sample, cover a wide range of interesting subjects, accompanied by beautiful illustrations, pertaining to the sea. The contributors, both foreign and American, officers and civilians, many of whom are distinguished in their specialties, so write as to interest both the associate and regular members as well as lay readers. In addition to the leading articles in the main body of the magazine, there are departments under the following headings: Discussions, Professional Notes, Notes on International Affairs, Book Reviews, and Secretary's Notes. For further information address Secretary-Treasurer.

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Special Notice

Naval Institute Prize Essay, 1931

A PRIZE NOT TO EXCEED FIVE HUNDRED DOLLARS WITH A GOLD MEDAL, and a life membership in the Institute (unless the author is already a life member, in which case he will receive the commuted value thereof), is offered by the Naval Institute for the best essay submitted on any subject pertaining to the naval profession.

The following rules will govern this competition:

1. The award of the prize to be made by the Board of Control, voting by ballot and without knowledge of the names of the competitors.

2. Each competitor to send his essay to the Secretary-Treasurer in a sealed envelope marked "Prize Essay Contest." The name of the writer shall not appear on the essay, but instead thereof a motto. Accompanying the essay a separate sealed envelope will be sent to the Secretary-Treasurer, with the motto on the outside and the writer's name and motto inside. This envelope will not be opened until after the decision of the board. Essays must be received on or before January 1, 1931.

3. In addition to the "Naval Institute Prize," one or more essays may receive "Honorable Mention," if of sufficient merit to justify that award; or, in the event that no essay is adjudged of sufficient merit to receive the "Prize," the best essay submitted may receive "Honorable Mention" in lieu thereof.

4. In case one or more essays receive "Honorable Mention" the writers thereof will each receive a prize, the amount of such awards to be decided by the Board of Control in each case.

5. Announcement of awards will be made as soon as practicable after January 1, 1931.

6. Essays awarded the "Naval Institute Prize" or "Honorable Mention" will be published in the NAVAL INSTITUTE PROCEEDINGS as soon as practicable. Essays not awarded a prize may be published at the discretion of the Board of Control, and the writers of such articles shall be compensated at the established rate for articles not submitted in competition.

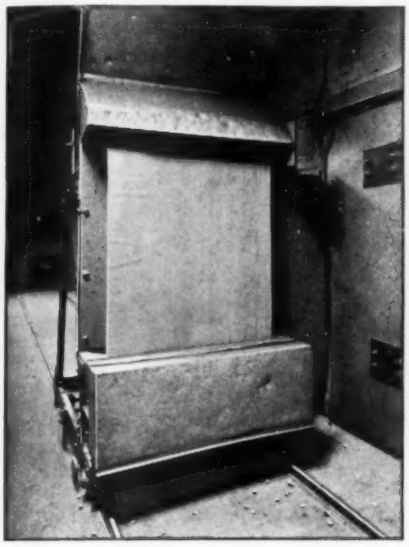
7. Articles should be limited to approximately 8,000 words, but shorter articles will receive equal consideration.

8. In event of the prize being awarded to the winner of a previous year, a gold clasp suitably engraved will be given in lieu of the medal.

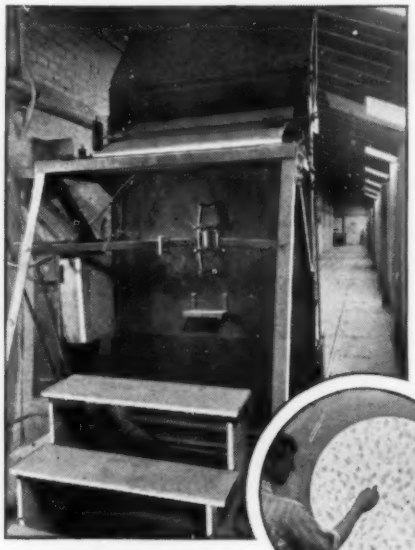
9. All essays must be typewritten, double spaced, and submitted in duplicate.

A. T. CHURCH
Captain, U.S.N., Secretary-Treasurer

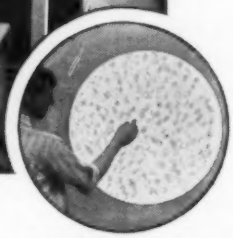
No. 7 OF A SERIES OF TALKS ON AMMUNITION QUALITY



(A) Front View of a Shotgun Target



(B) Rear View of a Shotgun Target



(C) Pattern Distribution or Counting the Pattern

Efficiency

The shooter is not only interested in the velocity, penetration and safety of his shotgun ammunition, but he is equally interested in the manner in which the shot pellets are distributed when they strike the target, whether it be game or clay birds.

This distribution is called the "pattern," and to accomplish the best results, this pattern should be even and uniform as in the illustration "C."

Patterns are measured at Brandywine Laboratory by means of a target as shown in illustration "A," where the shot pellets penetrate a sheet of paper suspended directly in front of a steel plate. The back of the target is shown in illustration "B," where it will be noted that an electrical make-and-break contact is attached to the middle of the plate and serves to measure the velocity simultaneously with the registration of the pattern.

The paper is then removed and the number of pellets counted by drawing a 30-inch circle whose center is the point of aim. In addition to the count, special attention is paid to the uniformity of distribution. A pattern unevenly distributed would allow of misses because there would be many gaps which would provide safety areas through which the live or inanimate target might escape.

A full choke gun should shoot 70% of its shot charge in a 30-inch circle at 40 yards and a true cylinder bore will not do better than 40%. Various modifications of the boring at the muzzle will come between these limits.

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PUBLICATIONS
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AVIATION

Aircraft Construction.
Prepared under the direction of Lieutenant Commander F. P. Thomas, U. S. Navy. This book presents aircraft in its general features together with elements requisite to a fundamental understanding of the subject. 1929. 232 pages. $3.00.

Naval Aviation. Revised edition. New illustrations. 1929. 140 pages. $1.75 postpaid.

Airplanes, Airships, and Aircraft Engines.
By Lieut. Albert Tucker (CC), U. S. Navy. 1921. 436 pages. $3.50 postpaid.

ENGINEERING

Naval Auxiliary Machinery.
Compiled by officers of the Department of Engineering and Aeronautics at the Naval Academy, this book covers auxiliaries used in the naval service, which were previously treated in several textbooks. 1929. 152 pages; 11 folders; many illustrations. $3.50 postpaid.

Principals of the Basic Mechanisms.
Prepared for use of midshipmen by Lieut. Comdr. R. N. S. Baker (CC), U. S. Navy, and Associate Professor W. E. Farrell, U.S.N.A. 1926. 135 pages. $3.75 postpaid.

Engineering Materials and Processes.
Prepared as a textbook for midshipmen. Is the successor of Danforth's *Mechanical Processes.* By Lieut. Comdrs. G. B. Ashe and J. I. Hale (CC), U. S. Navy. Reprinted 1930 with slight changes and corrections. 267 pages. $2.50 postpaid.

Internal Combustion Engines.
By the Department of Engineering and Aeronautics, Naval Academy. Third revised edition. 1929. 326 pages. $3.40 postpaid.

Naval Reciprocating Engines.
Compiled by Lieut. Comdr. L. P. Bischoff, U. S. Navy. Some material has been taken from *Naval Reciprocating Engines and Auxiliary Machinery,* by Barton and Stickney, and new material added. 1929. 208 pages; many illustrations. $2.50 postpaid.

Marine and Naval Boilers.
Compiled by officers of the Department of Engineering and Aeronautics, Naval Academy, this text has been completely rewritten with the exception of Chapters VI and X. 1929. 194 pages; 16 folders; many illustrations and diagrams. $3.00 postpaid.

Naval Turbines.
By Commanders O. L. Cox and M. A. Libbey, U. S. Navy. Prepared primarily for use in the instruction of midshipmen. 1924. 241 pages with many illustrations and drawings. $5.00 postpaid.

LANGUAGES

French Nautical Phrase Book and Reader.
By Professor P. J. des Garennes, U.S.N.A. 1921. 181 pages. $1.50 postpaid.

A Spanish Nautical Phrase Book and Reader.
By Professor Arturo Fernandez, U.S.N.A. 1925. 175 pages. $2.00 postpaid.

Writing and Speaking: a Handbook for Naval Officers.
By Professor Carroll S. Alden, U.S.N.A. (This book replaces *Composition for Naval Officers.*) 1927. 359 pages. $2.50 postpaid.

LAW

International Law for Naval Officers.
By Comdr. C. C. Soule, U. S. Navy, and Lieut. Comdr. C. McCauley, U. S. Navy. 245 pages. Revised 1928 by Lieut. Comdr. C. J. Bright, U. S. Navy. $2.00 postpaid.

Constitutional Law.
Reprinted 1924 with slight additions. By H. J. Fenton, M.A., LL.D. 351 pages. $2.25 postpaid.

MATHEMATICS

Engineering Mathematics.

Prepared by the Department of Mathematics. It is a revision of the 1925 edition and contains about 30 per cent more material. 1926. 94 pages. $2.70 postpaid.

Elementary Mechanics.

A complete revision of the 1922 edition, by Professor Paul Capron and Associate Professor L. T. Wilson, U.S.N.A. 1926. 473 pages. $5.00 postpaid.

MISCELLANEOUS

Naval Leadership: with Some Hints to Junior Officers and Others.

Third edition. 1929. 178 pages. $1.50 postpaid.

A Digest of Naval Communications.

Compiled by Lieutenant Commander James M. Lewis, U. S. Navy, primarily as a textbook for midshipmen, but the book will also provide an excellent text for officers preparing for examinations for promotion. 1928. 98 pages. $1.25 postpaid.

Matthew Fontaine Maury.

By Professor Charles L. Lewis, U.S.N.A. Foreword by Commander Byrd, U. S. Navy (Retired). A biography every American should read. 1927. 264 pages. $6.00 postpaid.

Man-of-War's Man's Manual.

By Rear Admiral R. R. Belknap, U. S. Navy (Retired). 1928. 241 pages, illustrated. $.65 postpaid.

Yankee Mining Squadron.

By Captain R. R. Belknap, U. S. Navy. 1920. 110 pages, illustrated. $1.00 postpaid.

Routine Book.

By Captain R. R. Belknap, U. S. Navy. 1918. 308 pages. $1.25 postpaid.

Index to Proceedings (Nos. 1 to 100) and (Nos. 101 to 200). $1.50 each, postpaid.

U. S. Navy Cook Book.

By School for Cooks and Bakers. U. S. Naval Training Station. Newport, Rhode Island. 1920. 130 pages. $.60 postpaid.

Physiology, Hygiene and First Aid.

By Captain R. G. Heiner (MC), U. S. Navy. 1928. 219 pages. $1.85 postpaid.

Manual of Athletic Requirements.

By Lieutenant Commander W. A. Richardson, U. S. Navy. Revised and enlarged edition. 1927. 692 pages. Profusely illustrated. $4.50 postpaid.

NAVAL CONSTRUCTION

Principles of Naval Architecture and Warship Construction.

By Lieut. Comdr. G. C. Manning (CC), U. S. Navy, and Lieut. T. L. Schumacher (CC), U. S. Navy. A treatise especially prepared to furnish in compact form the information required by the operating personnel of the U. S. Navy. Revised 1928. 377 pages, illustrated. $5.00 postpaid.

Naval Artificer's Manual.

By Lieut. McCall Pate (CC), U. S. Navy. 1918. 797 pages. $2.00 postpaid.

NAVAL ORDNANCE

Exterior Ballistics.

For the instruction of midshipmen. By Lieutenant E. E. Herrmann, U. S. Navy, under the direction of the Head of Department of Ordnance and Gunnery. 1930. 354 pages with tables and figures. $4.50 postpaid.

Range and Ballistic Tables.

Prepared for use of midshipmen as an auxiliary companion volume for *Exterior Ballistics*, and contains tables required with the latter textbook. 1930. $2.25 postpaid.

Naval Ordnance.

A textbook prepared for the use of midshipmen by officers of the United States Naval Academy. 1925. 641 pages, illustrated. $6.00 postpaid.

NAVIGATION

Aquino's "Newest" Sea and Air Navigation Tables.

By Commander Radler de Aquino, Brazilian Navy. For solving all problems by inspection. The simplest and readiest in solution. The safest and the most exact. 1927. 171 pages. $5.00 postpaid.

Navigation and Nautical Astronomy.

By Captain Benjamin Dutton, U. S. Navy. Third edition. 435 pages. 1930. $4.50 postpaid.

Navigation and Compass Deviation.

By Comdr. W. C. Muir, U. S. Navy. 1918. 784 pages. $4.20 postpaid.

Practical Manual of the Compass.

By Captain Harris Laning, U. S. Navy, and Lieut. Comdr. H. D. McGuire, U. S. Navy. 1921. 234 pages, illustrated. $3.90 postpaid.

Line of Position Book.

By Lieut. Comdr. P. V. H. Weems, U. S. Navy. 1928. 44 pages. $2.50 postpaid.

Azimuth Diagram.

Large separate diagram to accompany *Line of Position Book*. 1928. $.80 postpaid.

From "Where You Are" to "Where You Want to Go."

By Lieut. Comdr. Karl R. Shears, U. S. Navy. An elementary treatise of the mooring and maneuvering board. 1929. 37 pages, paper. $.50 postpaid.

PICTORIAL

Around the World with the Fleet, 1907-1909.

280 pages of the finest half-tone engravings showing pictures taken on this epic cruise. 1929. $3.50 postpaid.

The United States Fleet.

Second edition. By Lieutenant F. A. Edwards, U. S. Navy. A ready source of information and a pictorial acquaintance with the fleet. 1929. 80 pages; many illustrations. Paper. $.50 postpaid.

RADIO

Robison's Manual of Radio Telegraphy and Telephony.

Eighth revised edition. By Captain S. C. Hooper, U. S. Navy. 791 pages, illustrated. 1928. $4.00 postpaid.

Radio Manual.

Fourth edition. A textbook for midshipmen. Prepared for the Department of Electrical Engineering and Physics. 1928. 178 pages. $3.50 postpaid.

SEAMANSHIP

Watch Officer's Guide.

By Commander W. S. Farber, U. S. Navy. About 200 pages of text, 50 colored plates of flags, and a table of honors. 1930. $2.00 postpaid. Additional copies of the table of honors can be procured for ten cents each.

On a Destroyer's Bridge.

By Commander H. H. Frost, U. S. Navy. An officer's experience in handling a destroyer. 120 pages. 1930. $2.00 postpaid.

STRATEGY AND TACTICS

We Build a Navy.

By Lieutenant Commander H. H. Frost, U. S. Navy. A vivid and dramatic narrative of our early navy. 1929. xvi+501 pages, 33 illustrations. $4.00.

The Dardanelles Expedition.

Second edition. By Captain W. D. Puleston, U. S. Navy. A critical study of this amphibious undertaking. 1927. 172 pages including 70 illustrations. $2.80 postpaid.

Five Years in Turkey.

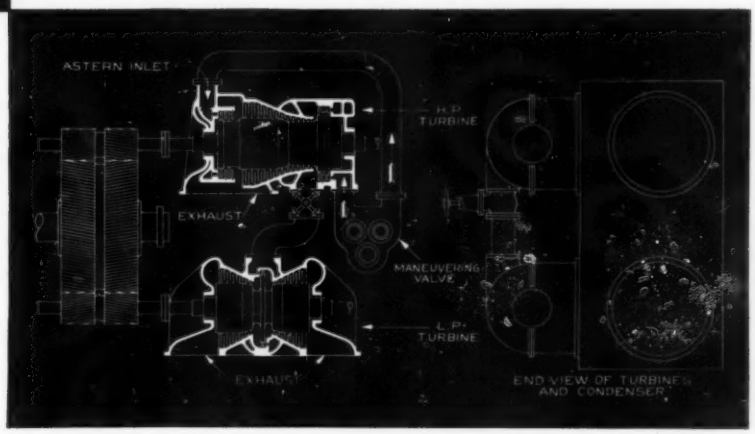
By General Liman von Sanders, Chief of the German Military Mission to Turkey. Translation by Colonel Carl Reichmann, U. S. Navy (Retired). 1927. 340 pages, illustrated and three military maps. $3.50 postpaid.

The Battle at Blanc Mont.

By Lieutenant Colonel Ernst Otto, German Army (Retired). This interesting analysis, which appeared in the PROCEEDINGS, is now in book form. 140 pages, illustrated. 1930. $2.00 postpaid.

8 GOOD REASONS

for Triple-divided-flow Geared Turbines for Combatant Ships . . .



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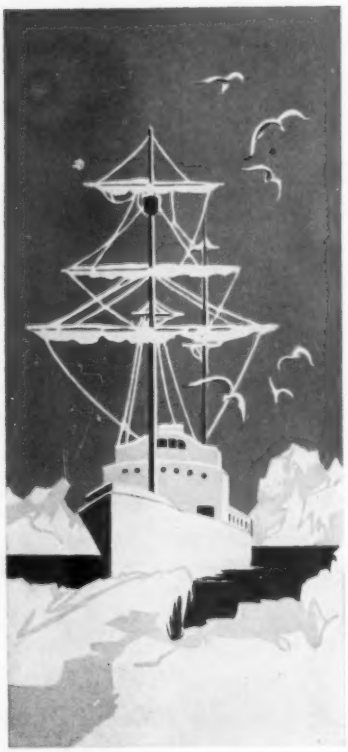

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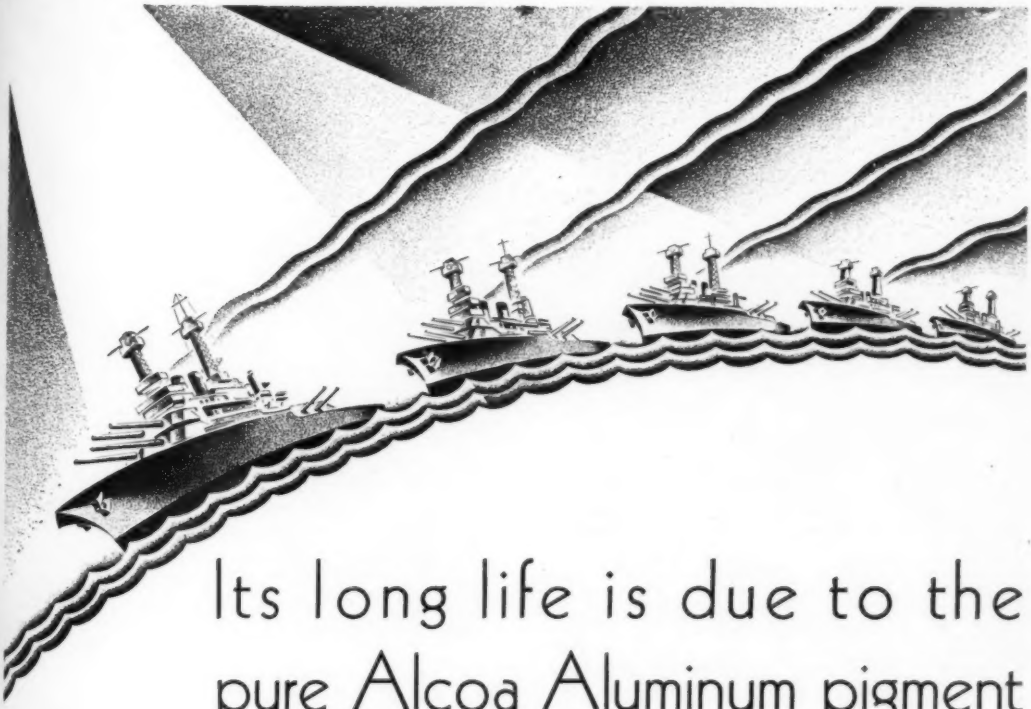

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ALUMINUM
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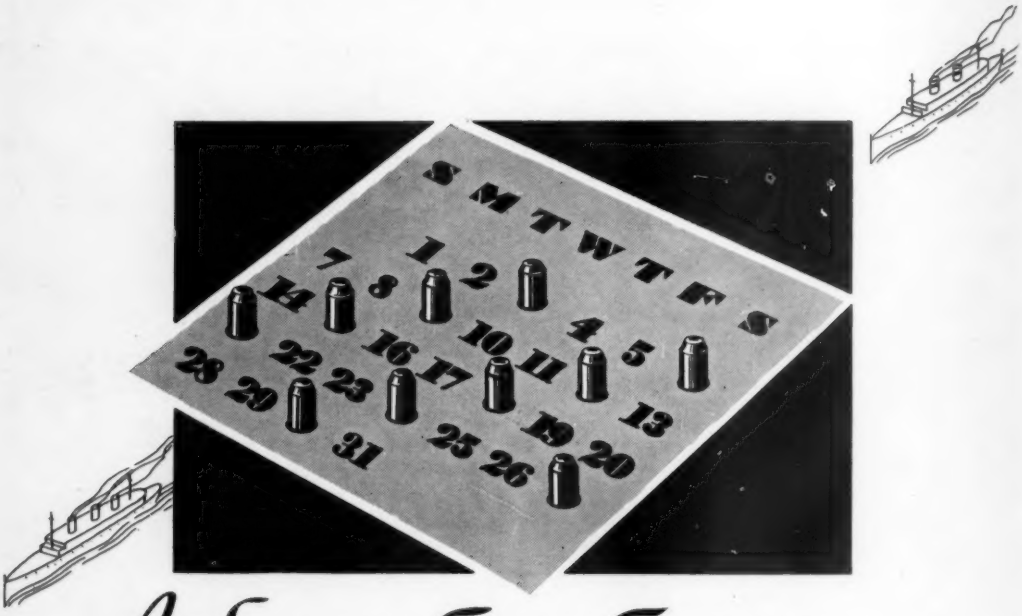

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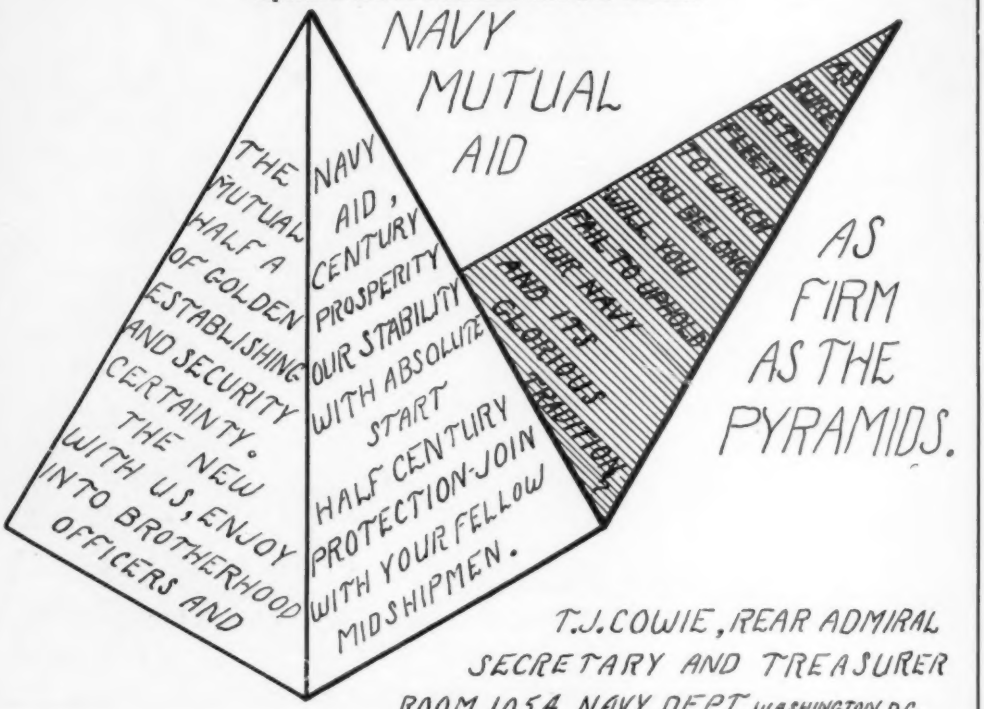
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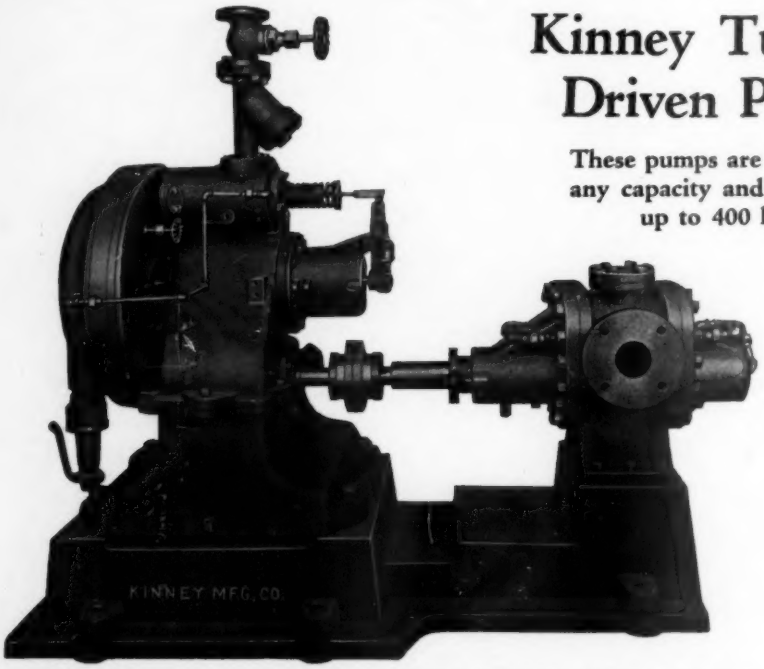

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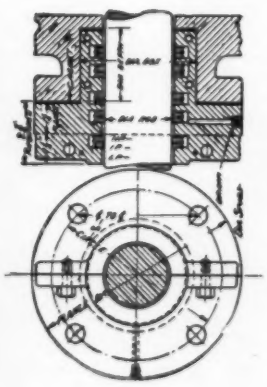

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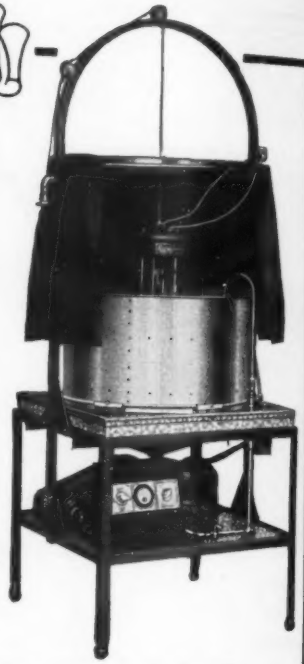

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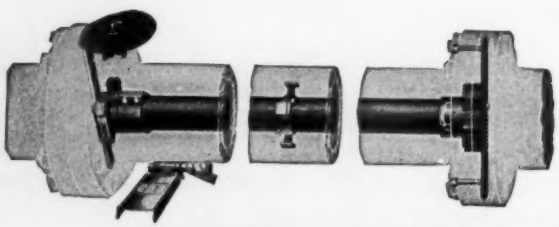

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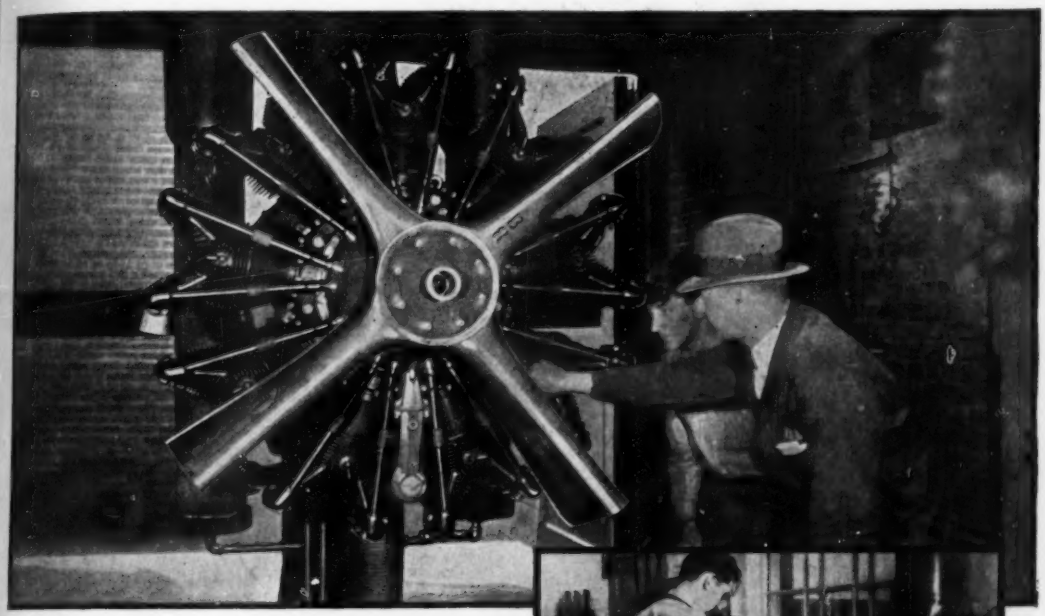

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